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Visakhi P Dr

Indian Institute of Science Education and Research Mohali, visakhi@iisermohali.ac.in

Ritu Gupta Miss

Shri Venkateswar University, Tirupati, ritu7648@gmail.com

B. M. Gupta Dr

National Institute of Science, Technology & Development Studies, New Delhi, bmgupta1@gmail.com

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Contribution and Impact of IISERs : A Scientrometric Assessment of Publications during 2010-14

P.Visakhi*, Ritu Gupta** & B.M.Gupta***

*Indian Institute of Science Education and Research Mohali, Knowledge City, Sector-81, SAS Nagar,

Mohali-140306

visakhi@iisermohali.ac.in

**Shri Venkateswar University, Tirupati

ritu7648@gmail.com

***National Institute of Science, Technology & Development Studies,

Dr K.S.Krishnan Marg, New Delhi 110 012, India

bmgupta1@gmail.com

ABSTRACT : This paper analyzes 2542 research publications of the five Indian Institute of Science Education & Research (IISER) published during the last Five years (2010-14), as covered in SCOPUS International database. The study analyses characteristics of these publications such as the publication growth, research impact, national and international collaboration share, contribution and impact of authors and organizations, major areas of research, and preferred channels of research communications and characteristics of higher cited papers. The findings reveal that IISERs publications have witnessed an annual average growth rate of 34.92% and registered an average citation impact per paper of 9.90. About 33.39% and 30.80% of the IISERs publications were involved in national and international collaboration during 2010-14. The major areas of research of IISERs were chemistry, physics & astronomy, materials science and biochemistry, genetics & molecular biology with institutional share of 43.94%, 34.19%, 24.86% and 19.71% during 2010-14. About 153 significant authors of five IISERs individually published 10-60 publications and together they contributed 2446 publications, accounting for 96.22% share in the total output of IISERs during 2010-14. The IISERs published 1102 papers (with 43.35% share in total output) during 2010-14 in top 40 most productive journals with high impact factor varying from 0.72 to 11.36. About 50 high cited papers were published by these five IISERs, which have received 50 and above citations, Among these 50 papers, 41 papers received 50 to 100 citations, 7 papers 101-200 citations, 1 paper 401-500 citations and 1 paper 1001-1100 citations. These 50 papers together received 5212 citations, registering an average citation per paper of 104.24.

KEYWORDS : IISER, IISER Mohali, IISER Kolkata, IISER Pune, IISER Bhopal, IISER Tiruvananthapuram, higher education, institution, India, publication productivity, citation impact, research collaboration, scientometrics, Impact of IISERs

1. INTRODUCTION

The present scenario of higher education in India is changing drastically and it is more inclined towards computer related subjects by pushing the science education and research to a back seat. As a result, the Government of India had to pay attention and feel its significance when it comes to know the ranking of the country in global scientific landscape that it started declining and also when it finds difficulty in getting faculty to teach the researchers in science across India. This made the Scientific Advisory Council to the Prime Minister of India (SAC-PM) to address the issue at the national level and submit its recommendation to the Government of India. After thorough debates, reviews and discussions, the Committee recommended for the creation of five new premier institutions devoted only to science education and research in frontier areas of science with the aim to create world class institutes. As a result, five **Indian Institutes of Science Education and Research (IISERs)** were established across India with autonomous status as Institutions of National importance under the Ministry of Human Resource Development (MHRD), Government of India (IISERs) broadly on the lines of the "Indian Institute of Science (IISc), Bangalore". They have been designed to reach the prestigious position in the global setting that IISc, IIMs and IITs presently enjoy [1]

Later in 2012, these institutions of National importance have been declared by Act of Parliament under the National Institutes of Technology (Amendment) Bill, 2010 (an amendment of the National Institutes of Technology Act, 2007), which was passed by the Rajya Sabha on 30 April 2012. Five IISERs have been established across the country, namely IISER- Kolkata (West Bengal) and IISER- Pune (Maharashtra) in the year 2006, IISER-Mohali (Punjab) in 2007, IISER Bhopal (Madhya Pradesh) and IISER-Thiruvananthapuram (Kerala) in 2008. A new IISER is just started functioning from August 2015 at Tirupati (Andhra Pradesh). Two more new IISERs, one at Brahmapur (Odisha) and other one in Nagaland have been announced by Govt of India in the 2015 Budget [2]. These Institutes are intended to be the IITs of basic sciences. These IISERs awards B.S-M.S dual degree, M.S-PhD integrated and PhD degree in basic Sciences, i.e., Mathematics, Physics, Chemistry and Biology. It also offers courses in interdisciplinary areas like earth & environmental sciences, astronomy & astrophysics, computational sciences, humanities & social sciences, etc.

The selection of students for admission is on merit basis through qualifying any of the following examinations: (i) Kishore Vaigyanik Protsahan Yojana (KVPY) - a scholarship program funded by the Department of Science and Technology (DST) , Government of India; (ii) IIT-JEE Merit List -Those who feature in the regular merit list and (iii) State and Central Boards (top 1% in each board in class 12th), (iv) IISERs Common Aptitude / Screening Test - conducted by all the IISERs together for students who meet the criteria of minimum percentage cut-off marks set by DST (Dept of Science and Technology) every year for eligibility. [2]. For the PhD Programme, candidates who have passed one of the national level tests are admitted after conducting a interview. Students of all courses including B.S-M.S dual degree, M.S-PhD integrated and PhD get fellowship throughout their course period. The high profile teaching faculty (involved in both teaching and research) at IISERs was selected on highly competitive basis from India and abroad.

Apart from teaching, IISERs faculty work on many extra-mural research projects from different scientific agencies/departments of the Government of India and several research projects of the institute also involve international collaboration. Better research funding, competitive and dedicated scientists /researchers, better research infrastructure and facilities, naturally leads to an increase in research output. The quality and quantity of IISERs output in the last five years is appreciated globally. The NATURE index published recently indicated that IISERs have come as No.4 position, after all the IITs put

together as No.1, all CSIR labs put together as No.2 and IISc as No.3. This is a remarkable output of IISERs by any Yardstick for an Institution which is less than 10 years old. If we count the age of above competitive Institutions in India, IISc has crossed 100 years of age, CSIR labs are more than 70 years old and the IITs are more than 50 years [3].

1.1 LITERATURE REVIEW

There are only few papers analyzing the performance of individual IISERs in the past. Among individual IISERs performances using publication and citation data, Visakhi and Gupta [4], K. R. Mulla · N. Senthil Kumar [5], Pathak [6] and Hadimani, Mulla and Kumar [7] studied the scientrometrics profile of publication by the researchers and faculty of Institute of Science Education and Research (IISER), Mohali during 2008-12 , IISER Bhopal 2009-13,14 and IISER Pune during 2009-14 and IISER Thiruvananthapuram during 2008-2013 by focusing on its publication growth characteristics, format, media of communication, research impact , quality, patterns of research collaboration, broad and narrow areas of research, contribution and citation impact of its more productive authors

2. OBJECTIVE OF THE STUDY

The main objectives of the present study are to analyze the broad characteristic features of the publications output of Five IISERs during 20010-14 by using quantitative and qualitative indicators. Since each IISER has been established in different period of time, the study mainly focused on publications released by IISERs during 2010- 2014 by keeping uniformity in base for analysis. In particular the study focuses on the following aspects: (i) · To study the growth and citation impact of its research output; (ii) · To study the research output and citation impact under narrow and broad subject areas; (iii) To analyze its national and international collaboration; (iv) To analyze the contribution and impact of its leading authors; and (v) To study the media of communication and characteristics of its high cited papers.

3. METHODOLOGY

Using SCOPUS affiliation search “Indian Institute of Science Education and Research” was searched in the month of October 2015 and it resulted in listing of all five IISERs. Each IISER was selected one by one and its search was restricted to years 2010-14 under “year tag”. Using this search strategy string (shown below), the publication data was further analyzed using the tags of “authorship”, “subject area”, “document type”, “source type”, “source title”, “keywords”, “affiliation” and “country/territory” for information on collaborative countries and publications, source journals, most productive authors, etc. Similar exercise was undertaken for all the five IISERs. In the last, the publication data of all five IISERs was combined. For impact factor, the year 2013 data has been used. A number of quantitative and qualitative indicators have been used here to study the performance of IISERs.

4. ANALYSIS

The five IISERs together contributed 2542 publications during 2010-14, increasing from 236 in 2010 to 756 in 2014, registering an annual average growth rate of 34.92%.

Table 1. Growth of Publications of Five IISERs during 2010-14

Publication Year	Number of Publications					
	IISER-Kolkata	IISER-Pune	IISER-Mohali	IISER-Bhopal	IISER-Thiruv	Total
2010	101	52	41	18	24	236
2011	144	99	64	35	40	382
2012	201	152	88	47	47	535
2013	195	186	105	90	57	633
2014	225	194	139	127	71	756
Total	866	683	437	317	239	2542

The highest number of publications (866) was contributed by IISER Kolkata during 2010-14, followed by IISER Pune (683), IISER Mohali (437), IISER Bhopal (317) and IISER Thiruvananthapuram (239) during 2010-14. In terms of individual IISER, the publication grew from 101 to 225 in IISER Kolkata, 52 to 194 in IISER Pune, 41 to 139 in IISER Mohali, 18 to 127 in IISER Bhopal and 24 to 71 in IISER Thiruvananthapuram from 2010 to 2014, experiencing an annual average growth rates of 23.64%, 42.65%, 36.32%, 65.33% and 32.50%, respectively during 2010-14 [Table 1].

Table 2. Citation Output of Five IISERs during 2010-14

Publication Year	Number of Citations					
	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv	Total
2010	6016	750	422	384	294	7866
2011	1628	987	749	1008	581	4953
2012	1621	1766	1081	738	1569	6775
2013	1138	1325	590	470	412	3935
2014	419	482	227	361	144	1633
Total	10822	5310	3069	2961	3000	25162

The average citation impact per paper registered by all publications of five IISERs was 9.90, with highest (12.55) registered by IISER Thiruvananthapuram, and followed by IISER Kolkata (12.50), IISER Bhopal (9.34), IISER Pune (7.77) and IISER Mohali (7.02) during 2010-14 [Tables 2-3].

Table 3. Average Citations Per Paper of Five IISERs during 2010-14

Publication Year	Average Citations per Paper					
	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv	Total
2010	59.56	14.4	10.3	21.3	12.25	33.3
2011	11.31	9.97	11.7	28.8	14.53	13.0
2012	8.065	11.6	12.3	15.7	33.38	12.7

2013	5.836	7.12	5.62	5.22	7.228	6.22
2014	1.862	2.48	1.63	2.84	2.028	2.16
Total	12.50	7.77	7.02	9.34	12.55	9.90

The IISER Kolkata and IISER Pune registered the highest value (30 each) of h-index, followed by IISER Mohali (27), IISER Bhopal (25), IISER Thiruvananthapuram (23) during 2010-14. In terms of share of high cited papers in total publications, the highest (0.837) was achieved by IISER Thiruvananthapuram, followed by IISER Bhopal (0.631), IISER Kolkata (0.346), IISER Pune (0.293) and IISER Mohali (0.229) during 2010-14 [Table 2-3]. In terms of extent of cited papers, the largest (82.29%) was registered by IISER Pune, followed by IISER Bhopal (79.18%), IISER Kolkata (79.18%), IISER Tiruvananthapuram (76.99%) and IISER Mohali (76.89%) during 2010-14.

4.1 National Collaborative Publications

The national collaborative output of five IISERs was 864 publications (Table 4-5), which constituted 33.39% share of its total output during 2010-14. The share of national collaborative output of individual five IISERs varied from 31.55% (IISER Bhopal) to 35.33% (IISER Kolkata) as shown in Table 4-5.

Table 4. Number of National Collaborative Publications of Five IISERs during 2010-14

Publication Year	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv
2010	43	28	26	13	6
2011	45	50	28	17	12
2012	61	42	35	14	18
2013	74	64	37	21	21
2014	63	53	57	35	21
Total	306	237	143	100	78

Table 5. Share of National Collaborative Publications of Five IISERs during 2010-14

Publication Year	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv	Total
2010	42.57	53.85	63.41	72.22	25	49.15
2011	31.25	50.51	43.75	48.57	30	39.79
2012	30.35	27.63	39.77	29.79	38.3	31.78
2013	37.95	34.41	35.24	23.33	36.8	34.28
2014	28.00	27.32	41.01	27.56	29.6	30.29
Total	35.33	34.7	32.72	31.55	32.60	33.99

Among the national collaborative output of five IISERs, the largest share of collaborative linkages (44.03%, 398 publications) were made to research institutes, followed by universities (35.73%, 323 publications), Institutes of National importance (29.87%, 270 publications) and others (10.51%, 95 publications). The share of individual IISER varies, as can be seen in Table 6. The significant national collaborative linkages of individual IISER with different type of organizations are shown in Table 6.

Table 6. Nature of National Collaborative Colleges of IISERs during 2010-14

Type of Organization	National Collaborative Publications by Type of Organizations					
	IISER-Kolkata	IISER-Pune	IISER-Mohali	IISER-Bhopal	IISER-Thiruv	Total
Institutes of National Importance	101 (33.0%)	34 (14.35%)	51 (27.87%)	51 (51.0%)	33 (42.31%)	270 (29.87%)
Research Institutes	134 (43.8%)	135 (56.96%)	78 (42.62%)	26 (26.0%)	25 (32.05%)	398 (44.03%)
Universities	124 (40.5%)	84 (35.44%)	75 (40.98%)	21 (21.0%)	19 (24.36%)	323 (35.73%)
Others	38 (12.4%)	33 (13.92%)	17 (9.29%)	6 (6.0%)	1 (1.28%)	95 (10.51%)
Total	306	237	183	100	78	904

4.3 International Collaboration

The number of international collaborative publications of five IISERs consisted of 783 (Table 7-8), which constituted 30.80% share of its total output during 2010-14.

Table 7. Number of International Collaborative Publications of Five IISERs during 2010-14

Publication Year	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv
2010	41	17	18	8	14
2011	54	33	29	13	19
2012	66	49	38	12	20
2013	63	51	26	19	20
2014	57	38	32	24	22

Total	281	188	143	76	95
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The individual share of international collaborative publications of five IISERs varied from 27.53% (IISER Pune) to 39.75% (IISER Thiruv) as can be seen in Table 8.

Table 8. Share of International Collaborative Publications of five IISERs during 2010-14

Publication Year	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv	Total
2010	40.59	32.69	43.9	44.44	58.33	41.53
2011	37.5	33.33	45.31	37.14	47.5	38.74
2012	32.84	32.24	43.18	25.53	42.55	34.58
2013	32.31	27.42	24.76	21.11	35.09	28.28
2014	25.33	19.59	23.02	18.9	30.99	22.88
Total	32.45	27.53	32.72	23.97	39.75	30.8

Table 9. International Collaborative Linkages of IISER with different countries, 2010-14

Collaborative Country	Number of International Collaborative Publications						
	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv	Total	%Total
USA	94	80	69	33	46	322	42.04
Germany	65	42	51	4	22	184	24.02
U.K.	32	18	9	2	25	86	11.23
France	15	18	10	6	8	57	7.44
Canada	21	5	9	11	5	51	6.66
Japan	19	8	7	19	6	40	5.22
Spain	8	11	18	0	3	40	5.22
Italy	11	14	5	2	5	37	4.83
Switzerland	3	14	5	5	5	32	4.18
China	13	10	3	0	5	31	4.05
Sweden	7	12	5	0	4	28	3.66
Israel	17	2	0	2	4	25	3.26
Australia	3	5	9	1	5	23	3.00
Netherland	4	4	7	2	3	20	2.61
Saudi Arabia	14	2	0	1	0	17	2.22
South Africa	6	0	3	7	0	16	2.09
South Korea	1	1	5	4	2	13	1.70

Finland	2	1	0	0	5	8	1.04
Total	281	188	143	76	78	766	100

In terms of collaborating countries, the largest number and share of collaborative linkages (322, 42.04%) of all IISERs were with United States, followed by Germany (184. 24.2%), U.K. (86. 11.23%), France (57, 7.44%), Canada (51, 6.66%), Japan and Spain (40, 5.22%), etc. [Table 9]. The significant national and international collaborative linkages of individual IISERs, however vary and are shown in Table 10-11.

Table 10. Significant National Collaborative Linkages of Individual IISER during 2010-14

Type of Organization	Name of IISER	Number of Collaborative Linkages
Universities	IISER Kolkata	Univ. of Calcutta (26), Jadavpur University (12), Presidency University, Kolkata (12), Panjab University-Chandigarh (11), University of Hyderabad (11), K.L. University (11), Karuna University (11), -Krishna University (7);
	IISER Pune	University of Pune (30), RTM Nagpur University (24); Absaheb Garware College-Pune (9); University of Hyderabad (7); BHU-Varabasi (5)
	IISER Mohali	Panjab University (43), GND University (11), Anna Univ (9), BHU (5), d a Univ (3), Univ Calcutta (3)Ap
	IISER Bhopal	University of Delhi (4); Vivekand Degree College (4); Mangalore University (3); University of Calcutta (3); BHarathidasan Univ (3), Univ Hyderabad (3), Univ Pune 3), Univ. Jammu (3)
	IISER Thiruvananthapuram	D A Univ (5), Cochin Univ of S&T (5), IUCAA-Pune (2), Madurai Kamraj Univ (2), Univ of Hyderabad (2), JNU-Delhi (2)
Institutes of National Importance	IISER Kolkata	IIT-Kharagpur (40), IISc-Bangalore (37), IIT-Kanpur (23), IIT-Bombay (10), IISER-Mohali (8)
	IISER Pune	IISc-Bangalore (17); IISER-Kolkata (7); IUCAA-Pune (6)
	IISER Mohali	IIT-Kanpur (19), IISc-Bangalore (11); IISER-Kolkata (7); IIT-Madras (6); IISER-Thiru (2)
	IISER Bhopal	IIT-Kanpur (23), IISc-Bangalore (14); IIT-Indore (7); IIT-Guwahati (5)
	IISER Thiruvananthapuram	IISc-Bangalore (23), IIT-Kharagpur (6); IIT-Madras (4); IIT-Bombay (2); IISER-Mohali (2); IISER-Pune (2)
Research Institutes	IISER Kolkata	IACS-Kolkata (25), ILS-Bhubaneswar (24), JNCASR-Bangalore (16), TIFR-Mumbai (16), PRL - Ahmedabad (15), BARC-Mumbai (10)
	IISER Pune	NCL-Pune (44), PRL-Ahmedabad (14); JNCASR-Bangalore (10); TIFR-Mumbai (9); CCMB-Hyderabad (8); NCCS-Pune (7), IOP-Bhubaneswar (5); NCRA-Pune (5); NIIST-Thiruv (5)
	IISER Mohali	IMTECH-Chandigarh (16); IMS-Allahabad (8); JNCASR-Bangalore (7); NCL-Pune (6); RRI-Bangalore (6); CCMB-Hyderabad (5); IGCAR (4); TIFR-Mumbai (4)
	IISER Bhopal	TIFR-Mumbai (9); PRL-Ahmedabad (5); IOP-Bhubaneswar (3); BARC-

		Mumbai (3); Research Center for Biotechnology (3); IACS-Kolkata (2)
	IISER Thiruvananthapuram	IACS-Kolkata (11); NIIST-Thiruv (9); NCL-Pune (4); Chennai Mathematical Institute (4)
Industry	IISER Kolkata	Dr Reddy Laboratories, Hyderabad ; GE Global Research India (7)
	IISER Mohali	Dr Reddy Laboratories, Hyderabad (3)
Others	IISER Kolkata	BITS- Pilani (7)
	IISER Pune	BITS-Pilani (5)
	IISER Mohali	BITS-Pilani (8)

Table 11. Significant International Collaborative Linkages of Individual IISER during 2010-14

S.No	Name	
1	IISER Kolkata	Univ. of Gottingen, Sweden (26), King Abdullah University, Saudi Arabia (13); Bar Ilan University, Israel (6); Cornell University, USA (6); Ben Gurion University of Nagev, Israel (6); University of KwaZulu-Natal, South Africa (5); Universitat Stuttgart, Germany (5); Cleveland Clinic, USA (5), MIT, USA (5)
2	IISER Pune	Paul Scherer Institute (14), Zoo Outreach Org Zoo (10); Los Alamos National Laboratory, USA (10); University of Basel (9); Uppsala Universitet (8); SAIC-Fredrick (8), St Alberts College (7), University of Heidelberg (7); University of Maryland (7); Instituto Di Radioastronona Pologna (6)
3	IISER-Mohali	Max Planck Institute for Chemistry (20); Johannes Gutenberg Universitat Mainz (11); MIT (9); University of California, Los Angles (8); University of Gottingen (8); Universitat de Barcelona (7); Helsingin Yiopiato (7); Institute for Theoretical Solid State Physics (4); Arizona State University (4); Wageningen University & Research Center (4); Bookhaven National Lab (4)
4	IISER Bhopal	Osaka University (12); Lehigh University (5) University of California, Berkeley (4); University of Rochester (4); Yale University (3); University of KwaZulu-Natal (3); RIKEN-Japan (3); MIT (3); University of Wisconsin (3)
5	IISER-Thiruvananthapuram	Northwestern Univesity (10); Max Planck Institut fur Chemische Physikfester Stoffe (9); University of Portsmouth (7); Iowa State University (6); University of Rostock (5); Queens Belfast University (5); National Renewable Energy Lab (5); University of Cambridge (4); Rice University (4); Cornell University (4); University of Shieffield (3); Universite de Geneve (3); University of Bonn (3); University of Antwerpen (3); University of California, Davis (3)

4.4 Subject-Wise Distribution of Publications

Chemistry contributed the largest publication share (43.94%, 1117) to total output of IISERs during 2010-14 followed by Physics & Astronomy (34.19%, 869), Materials science (24.86%, 632), Biochemistry, Genetics & Molecular Biology (19.71%, 501), Chemical engineering (11.61%, 295), Mathematics (8.10%, 206), Medicine (203, 7.99%), Engineering (5.78%), Agricultural & Biological sciences (5.63%, 143), Earth & Planetary sciences (5.11%, 130), etc.

Table 12. Broad Subject-Wise Distribution Of IISERs Overall Output during 2010-14

Broad Subject											
	TP	%TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP	%NCP
Chemistry	1117	43.94	10153	9.09	21	5	0.45	230	20.59	383	34.29
Physics & Astronomy	869	34.19	5551	6.39	16.4	4	0.46	304	34.98	332	38.20
Materials Science	632	24.86	6043	9.56	16.8	5	0.79	161	25.47	236	37.34
Biochemistry, Genetics & Molecular Biology	501	19.71	5358	10.69	15.0	1	0.20	142	28.34	195	38.92
Chemical Engineering	295	11.61	2999	10.17	12.0	1	0.34	51	17.29	100	33.90
Engineering	147	5.78	1229	8.36	5.8	2	1.36	52	35.37	79	53.74
Mathematics	206	8.10	621	3.01	5.4	0	0.00	78	37.86	93	45.15
Medicine	203	7.99	1593	7.85	8.0	1	0.49	67	33.00	76	37.44
Earth & Planetary Science	130	5.11	853	6.56	6.4	0	0.00	86	66.15	28	21.54
Agricultural & Biological Sciences	143	5.63	609	4.26	6.2	0	0.00	58	40.56	59	41.26
Pharmacology, Toxicology & Pharmaceutics	91	3.58	898	9.87	7.4	0	0.00	12	13.19	52	57.14
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI-h-index; HCP=High Cited papers (receiving 100 or more citations); NCP=National Collaborative Publications and ICP=International Collaborative Publications'											

In terms of citation impact, Biochemistry, Genetics & Molecular Biology registered the highest citation impact per paper (10.69), followed by Chemistry Engineering (10.17), Pharmacology, Toxicology & Pharmaceutics (9.87), Materials science (9.56), Chemistry (9.09), Engineering (8.36), Medicine (7.85), Earth & Planetary sciences (6.56), Physics & Astronomy (6.39), etc.

Pharmacology, Toxicology & Pharmaceutics registered the highest share (57.14%) in National collaborative papers, followed by Engineering (53.74%), Mathematics (45.15%), Agricultural & Biological sciences (41.26%), Biochemistry, Genetics & Molecular Biology (38.92%), Physics & Astronomy (38.2%), medicine (37.44%), Materials science (36.34%), Chemistry (34.29%), etc.

Among the international collaborative publication, Earth & Planetary sciences registered the highest publication share (66.15%), followed by Agricultural & Biological sciences (40.56%), Mathematics (37.86%), Engineering (35.37%), Physics & Astronomy (34.98%), Medicine (33.0%), Biochemistry, Genetics & Molecular Biology (28.34%), Materials science (25.47%), Chemistry (20.59%), etc.

Engineering registered the highest share (1.36%) in high cited papers, followed by Materials science (0.79%), Medicine (0.49%), Physics & Astronomy (0.46%), Chemistry (0.45%), etc.[Table 12]

Table 13. Scientometric Profile of Chemistry Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
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IISER Kolkata	398	3448	8.66	25	2	0.50	96	24.12	135
IISER Pune	293	2885	9.85	25	1	0.34	49	16.72	83
IISER Mohali	156	1040	6.67	16	1	0.64	38	24.36	69
IISER Bhopal	162	1718	10.60	22	1	0.62	15	9.26	51
IISER Thiru	108	1062	9.83	17	0	0.00	32	29.63	45
Total	1117	10153	9.09	105	5	0.45	230	20.59	383
TP=Total Papers; TC=Total Citations; ACP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

IISER Kolkata contributed the highest number and share of papers (398 papers, 45.96%) in the area of chemistry, followed by IISER Pune (293 papers, 42.90%), IISER Bhopal (162, 51.10%), IISER Mohali (156 papers, 24.71%) and IISER Thiru (108 papers, 45.19%) during 2010-14. IISER Bhopal registered the highest citation impact per paper (10.60) in chemistry, followed by IISER Pune (9.85), IISER Thiru (9.83), IISER Kolkata (8.66) and IISER Mohali (6.67%). IISER Thiru registered the highest international collaborative publication share (29.63%) in chemistry, followed by IISER Mohali (24.36%), IISER Kolkata (24.12%), IISER Pune (16.72%) and IISER Bhopal (9.26%). IISER Mohali registered the highest national collaborative publications share (44.23%), followed by IISER Thiru (41.67%), IISER Kolkata (33.92%), IISER Bhopal (31.48%) and IISER Pune (28.33%). IISER Mohali registered the highest high cited publications share (0.64%), followed by IISER Bhopal (0.62%), IISER Kolkata (0.50%) and IISER Pune (0.34%) [Table 13].

Table 14. Scientometric Profile of Physics & Astronomy Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISER Kolkata	314	1834	5.84	20	2	0.64	87	27.71	137
IISER Pune	223	1209	5.42	17	0	0.00	83	37.22	77
IISER Mohali	139	1187	8.54	16	1	0.72	57	41.01	48
IISER Bhopal	98	655	6.68	14	1	1.02	31	31.63	44
IISER Thiru	95	666	7.01	15	0	0.00	46	48.42	26
Total	869	5551	6.39	16.4	4	0.46	304	34.98	332
TP=Total Papers; TC=Total Citations; ACP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the area of physics & astronomy, IISER Kolkata contributed the largest number of publication and institutional share (314, 36.26%), followed by IISER Pune (223, 32.65%), IISER Mohali (139, 15.10%), IISER Bhopal (98, 30.91%) and IISER Thiru (95, 39.75%). IISER Mohali registered the highest citation impact per paper (8.54), followed by IISER Thiru (7.01), IISER Bhopal (6.68), IISER Kolkata (5.84) and IISER Pune (5.42). IISER Bhopal registered the highest national publication share (44.90%), followed by IISER Kolkata (43.63%), IISER Pune and IISER Mohali (34.53% each) and IISER Thiru (27.37%). IISER Thiru registered the highest international collaborative publications share (48.42%), followed by IISER Mohali (41.01%), IISER Pune (37.22%), IISER Bhopal (31.63%) and IISER Kolkata (27.71%). IISER Mohali registered the highest high cited papers share (0.64%), followed by IISER Bhopal (0.62%), IISER Kolkata (0.50%) and IISER Pune (0.34%) [Table 14].

Table 15. Scientometric Profile of Materials Science Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP
IISER Kolkata	252	2139	8.49	24	1	0.40	62	24.60
IISER Pune	173	1732	10.01	20	1	0.58	41	23.70
IISER Mohali	66	584	8.85	11	1	1.52	18	27.27
IISER Bhopal	65	605	9.31	12	1	1.54	11	16.92
IISER Thiru	76	983	12.93	17	1	1.32	29	38.16
Total	632	6043	9.56	16.8	5	0.79	161	25.47

TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers

IISER Kolkata contributed the largest number of publication and share (252, 29.10%) in materials science, followed by IISER Pune (173, 15.33%), IISER Thiru (76, 31.80%), IISER Mohali (66, 15.10%) and IISER Bhopal (65, 20.54%). IISER Thiru registered the highest citation impact per paper (12.93) in materials science followed by IISER Pune (10.01%), IISER Bhopal (9.31), IISER Kolkata (8.49) and IISER Mohali (8.85). IISER Kolkata registered the highest national collaborative publications share (40.87) in materials science, followed by IISER Mohali (39.39%), IISER Pune (35.26%), IISER Bhopal (33.85%) and IISER Thiru (31.58%). IISER Thiru on the other hand, registered the largest international collaborative publications share (38.16%), followed by IISER Mohali (27.27%), IISER Kolkata (24.60%), IISER Pune (23.70%) and IISER Bhopal (16.92%). IISER Bhopal registered the highest high cited publication share (1.54), followed by IISER Mohali (1.52%), IISER Thiru (1.32%), IISER Pune (0.59%) and IISER Kolkata (0.40%)[Table 15].

Table 16. Scientometric Profile of Biochemistry, Genetics & Molecular Biology Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	122	946	7.75	15	0	0	38	31.15	58
IISER Pune	154	1394	9.05	17	0	0	38	24.68	66
IISER Mohali	108	761	7.05	15	0	0	33	30.56	41
IISER Bhopal	83	930	11.20	16	0	0	11	13.25	25
IISER Thiru	34	1327	39.03	12	1	2.94	22	64.71	5
Total	501	5358	10.69	15	1	0.20	142	28.34	195

TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers

In the field of biochemistry, genetics & molecular biology, IISER Pune contributed the largest number of publications and share (154, 22.55%), followed by IISER Kolkata (122, 14.09%), IISER Mohali (108, 24.71%), IISER Bhopal (83, 26.18%) and IISER Thiru (34, 14.23%). IISER Thiru registered the highest citation impact per paper (39.03), followed by IISER Bhopal (11.20), IISER Pune (9.05), IISER Kolkata (7.75) and IISER Mohali (7.05). IISER Kolkata registered the highest national collaborative publications share (47.54%), followed by IISER Pune (42.86%), IISER Mohali (37.96%), IISER Bhopal (30.12%) and IISER Thiru (14.71%). IISER Thiru registered the highest international collaborative publications share

(64.71%), followed by IISER Kolkata (31.15%), IISER Mohali (30.56%), and IISER Bhopal (13.25%). IISER Thiru in the only organization registering high cited publication share of 2.94% [Table 16].

Table 17. Scientometric Profile of Chemical Engineering Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	113	1267	11.21	20	0	0	22	19.47	33
IISER Pune	88	1108	12.59	17	1	1.14	16	18.18	26
IISER Mohali	27	63	2.33	4	0	0	1	3.70	18
IISER Bhopal	35	192	5.49	8	0	0	0	0.00	8
IISER Thiru	32	369	11.53	11	0	0	12	37.50	15
Total	295	2999	10.17	12	1	0.34	51	17.29	100
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the field of chemical engineering, IISER Kolkata contributed the largest number of publications and share (113, 13.05%), followed by IISER Pune (88, 12.88%), IISER Bhopal (35, 11.04%), IISER Thiru (32, 10.85%) and IISER Mohali (27, 9.15%). The IISER Thiru registered the highest citation impact per paper (11.53), followed by IISER Bhopal (5.49), IISER Pune (12.59), IISER Kolkata (11.21) and IISER Mohali (2.33). The IISER Kolkata registered the highest national collaborative publications share (47.54%), followed by IISER Pune (42.86%), IISER Mohali (37.96%), IISER Bhopal (30.12%) and IISER Thiru (14.71%). IISER Thiru registered the highest international collaborative publications share (64.71%), followed by IISER Kolkata (31.15%), IISER Mohali (30.56%), and IISER Bhopal (13.25%). IISER Thiru in the only organization registering high cited publication share of 2.94% [Table 17].

Table 18. Scientometric Profile of Engineering Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	85	661	7.78	13	0	0	37	43.53	48
IISER Pune	26	255	9.81	5	1	3.85	5	19.23	12
IISER Mohali	15	28	1.87	3	0	0	3	20.00	8
IISER Bhopal	8	16	2.00	3	0	0	2	25.00	4
IISER Thiru	13	269	20.69	5	1	7.69	5	38.46	7
Total	147	1229	8.36	5.8	2	1.36	52	35.37	79
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the area of engineering, IISER Kolkata contributed the largest number of papers and institutional share (85, 9.81%), followed by IISER Pune (26, 3.81%), IISER Mohali (15, 3.43%), IISER Thiru (13, 5.43%) and IISER Bhopal (8, 2.52%) during 2010-14. IISER Thiru registered the highest (20.69) citation per paper, followed by IISER Pune (9.81), IISER Kolkata (7.78), IISER Bhopal (2.0) and IISER Mohali (1.87) during 2010-14. IISER Kolkata registered the highest (43.53%) share of international collaborative papers, followed by IISER Thiru (38.46%), IISER Bhopal (25.0%), IISER Mohali (20.0%) and IISER Pune (19.23%). IISER Kolkata also registered the highest share (56.47%) of national collaborative papers, followed by IISER Thiru (53.85%), IISER Mohali (53.33%), IISER Bhopal (50.0%) and IISER Pune (46.15%) [Table 18].

Table 19. Scientometric Profile of Mathematics Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	70	205	2.93	8	0	0	31	44.29	37
IISER Pune	55	188	3.42	7	0	0	22	40.00	18
IISER Mohali	57	194	3.40	7	0	0	16	28.07	31
IISER Bhopal	10	15	1.50	2	0	0	3	30.00	3
IISER Thiru	14	19	1.36	3	0	0	6	42.86	4
Total	206	621	3.01	5.4	0	0	78	37.86	93
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the area of mathematics, IISER Kolkata contributed the largest number of papers with institutional share (70, 8.08%), followed by IISER Mohali (57, 13.04%), IISER Pune (55, 8.05%), IISER Thiru (14, 5.86%) and IISER Bhopal (10, 3.10%) during 2010-14. IISER Pune registered the highest (3.42) citation per paper, followed by IISER Mohali (3.40), IISER Kolkata (2.93), IISER Bhopal (1.50) and IISER Thiru (1.36). IISER Kolkata registered the highest share (44.29%) of international collaborative papers, followed by IISER Thiru (42.86%), IISER Pune (40.0%), IISER Bhopal (30.0%) and IISER Mohali (28.07%). IISER Mohali registered the highest share (52.86%) share of national collaborative papers, followed by IISER Kolkata (52.86%), IISER Pune (32.73%), IISER Bhopal (30.0%) and IISER Thiru (28.57%) [Table 19].

Table 20. Scientometric Profile of Medicine Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	65	250	3.85	9	0	0	22	33.85	24
IISER Pune	34	342	10.06	12	0	0	9	26.47	20
IISER Mohali	38	146	3.84	6	0	0	11	28.95	19
IISER Bhopal	45	753	16.73	9	1	2.22	15	33.33	11
IISER Thiru	21	102	4.86	4	0	0	10	47.62	2
Total	203	1593	7.85	8	1	0.49	67	33.00	76
TP=Total Papers; TC=Total Citations; ACPP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the area of medicine, IISER Pune published the largest number of papers with institutional share (85, 12.45%), followed by IISER Kolkata (65, 7.51%), followed by IISER Bhopal (45, 14.25%), IISER Mohali (38, 8.70%), and IISER Thiru (21, 8.79%) during 2010-14. IISER Bhopal registered the highest (16.73) citation per paper, followed by IISER Pune (10.06), IISER Thiru (4.86), IISER Kolkata (3.85) and IISER Mohali (3.84). IISER Thiru registered the highest share (47.62%) of international collaborative papers, followed by IISER Kolkata (33.85%), IISER Bhopal (33.33%), IISER Mohali (28.95%) and IISER Pune (26.47%). IISER Pune registered the highest share (58.82%) of national collaborative papers, followed by IISER Mohali (50.0%), IISER Kolkata (36.92%), IISER Bhopal (24.44%) and IISER Thiru (9.52%) [Table 20].

Table 21. Scientometric Profile of Earth & Planetary Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
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IISERKolkata	65	447	6.88	12	0	0	37	56.92	10
IISER Pune	23	109	4.74	6	0	0	17	73.91	11
IISER Mohali	25	250	10.00	9	0	0	22	88.00	2
IISER Bhopal	15	42	2.80	4	0	0	9	60.00	4
IISER Thiru	2	5	2.50	1	0	0	1	50.00	1
Total	130	853	6.56	6.4	0	0	86	66.15	28
TP=Total Papers; TC=Total Citations; ACP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In Earth & Planetary sciences, IISER Kolkata contributed the highest number of papers and institutional share (65, 7.51%), followed by IISER Mohali (25, 5.72%), IISER Pune (23, 3.37%), IISER Bhopal (15, 4.73%) and IISER Thiru (2, 0.84%) during 2010-14. IISER Mohali registered the highest (10.0) citation per paper, followed by IISER Kolkata (6.88), IISER Pune (4.74), IISER Bhopal (2.80) and IISER Thiru (2.50). IISER Mohali achieved the highest share (88.0%) share of international collaborative papers, followed by IISER Pune (73.91%), IISER Bhopal (60.0%), IISER Kolkata (56.92%) and IISER Thiru (50.0%). IISER Thiru registered the highest share (50.0%) of national collaborative papers, followed by IISER Pune (47.83%), IISER Bhopal (26.67%), IISER Kolkata (15.38%) and IISER Mohali (8.0%) [Table 21].

Table 22. Scientometric Profile of Agricultural & Biological Sciences Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	53	229	4.32	9	0	0	26	49.06	18
IISER Pune	43	211	4.91	9	0	0	18	41.86	23
IISER Mohali	26	82	3.15	5	0	0	6	23.08	15
IISER Bhopal	10	55	5.50	5	0	0	2	20.00	0
IISER Thiru	11	32	2.91	4	0	0	6	54.55	3
Total	143	609	4.26	32	0	0	58	40.56	59
TP=Total Papers; TC=Total Citations; ACP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the area of Agricultural & Biological sciences, IISER Kolkata contributed the largest number of papers and institutional share (53, 6.12%), followed by IISER Pune (43, 6.30%), IISER Mohali (26, 5.95%), IISER Thiru (11, 4.60%) and IISER Bhopal (10, 3.15%) during 2010-14. IISER Bhopal registered the highest (5.50) citation per paper, followed by IISER Pune (4.91), IISER Kolkata (4.32), IISER Mohali (3.15) and IISER Thiru (2.91). IISER Thiru registered the highest (54.55%) share of international collaborative papers, followed by IISER Kolkata (49.06%), IISER Pune (41.86%), IISER Mohali (23.08%) and IISER Bhopal (20.0%). IISER Mohali registered the highest share (57.69%) of national collaborative papers, followed by IISER Pune (53.49%), IISER Kolkata (33.96%) and IISER Thiru (27.27%) [Table 22].

Table 23. Scientometric Profile of Pharmacology, Toxicology & Pharmaceutics Research in IISERs during 2010-14

Name	TP	TC	ACPP	HI	HCP	%HCP	ICP	%ICP	NCP
IISERKolkata	24	211	8.79	10	0	0	1	4.17	15
IISER Pune	34	342	10.06	12	0	0	9	26.47	20
IISER Mohali	14	60	4.29	4	0	0	1	7.14	8

IISER Bhopal	17	272	16.00	9	0	0	0	0.00	8
IISER Thiru	2	13	6.50	2	0	0	1	50.00	1
Total	91	898	9.87	37	0	0	12	13.19	52
TP=Total Papers; TC=Total Citations; ACP=Average Citations Per Paper; HI=h-index; HCP=High Cited Papers; ICP=International Collaborative Papers; NCP=National Collaborative Papers									

In the area of Pharmacology, Toxicology and Pharmaceutics, IISER Pune contributed the largest number of papers and institutional share (34, 4.98%), followed by IISER Kolkata (24, 2.77%), IISER Bhopal (17, 5.36%), IISER Mohali (14, 3.20%) and IISER Thiru (2, 0.84%) during 2010-14. IISER Bhopal registered the highest (16.0) citation per paper, followed by IISER Pune (10.06), IISER Kolkata (8.79), IISER Thiru (6.50) and IISER Mohali (4.29). IISER Thiru registered the highest share (50.0%) of international collaborative papers, followed by IISER Pune (26.47%), IISER Mohali (7.14%), IISER Kolkata (4.17%) and IISER Bhopal (0.0%) [Table 23].

4.5 Significant Keywords

Among the significant keywords identified in IISERs output, the largest number of papers (114) were published on catalysis, followed by fluorescence (106), molecular models (105), density functional theory (70), DNA (69), crystal structure, genetics and quantum theory (62 each), polymers (62), chemical synthesis (60), protein expression (56), molecules (54), ligands, Nanoparticles, NMR spectroscopy, peptides and thermodynamics (50 each), drug synthesis and kinetics (49 each), stereoisomerism (48), X-Ray crystallography (47), molecular sequence data and physiology (46 each), stereochemistry (45), Escherichia coli (39), catalyst and gene expression (37 each), polymerization (34), secondary protein structure (33), drug structure (31), supermolecular chemistry (31), carbon (30), drosophila melanogaster and quantum chemistry (30 each), etc. These keywords reflect the nature of research undertaken.

4.6 Contribution and Impact of Most Productive Authors

The scientometric profile of top most productive authors publishing 10 or more publications of the five IISERs are given Tables 24-28. Taken together, there were 153 authors in IISERs who had published 10-60 publications and together 2446 publications, accounting for 96.22% share of the total output of IISERs during 2010-14. Of these 153 authors, 88 belong to chemistry, 32 to physics, 17 to life sciences, 11 to materials science, 5 to earth & planetary sciences, 2 to engineering, 1 to immunology and 1 to miscellaneous during 2010-14. Of these 153 authors, 63 are affiliated to IISER Kolkata, 46 to IISER Pune, 16 to IISER Mohali, 18 to IISER Bhopal and 10 to IISER Thiruvananthapuram.

Of the 153 authors, 123 authors contributed 10-20 papers, 23 authors 21-30 papers, 6 authors 31-40 papers and 1 author 51-60 papers. These 153 authors together contributed 2446 publications, accounting for 96.22% share of the total output of IISERs during 2010-14. These 153 authors together registered average citation per paper of 9.19 and average share of international collaborative papers of 23.55% during 2010-14.

The top 10 most productive authors were: (i) P.K. Panigrahi of IISER Kolkata with 60 papers in physics, (ii) S.S. Zade of IISER Kolkata with 40 papers in chemistry, (iii-iv) S.Banerjee and S.K. Mandal of IISER Kolkata with 37 papers each in engineering and chemistry, (v) C.M.Reddy of IISER Kolkata with 34 papers in chemistry, (vi) P.De of IISER Kolkata with 33 papers in materials science, (vii) P.Purkayastha of

IISER Kolkata with 32 papers in chemistry, (viii) N.K. Subhedar of IISER-Pune with 28 papers in neurosciences, (ix) D.Chopara of IISER Bhopal with 28 papers in chemistry, (x) A.Datta of IISER Thiruv with 28 papers in chemistry and (x1) D.Halder of IISER Kolkata with 28 papers in chemistry during 2010-14.

The top 10 authors in terms of average citation per paper (ACPP) were: (i) K.Kumar of IISER Bhopal with ACPP of 67.30 in microbiology & immunology, (ii) Y. Singh of IISER Mohali with ACPP of 41.40 in physics, (iii) S.S.Nagarkar of IISER Pune with ACPP of 35.00 in chemistry, (iv) A.K.Chaudhury of IISER Pune with ACPP of 31.79 in chemistry, (v) M. Jaganmohan of IISER Pune with ACPP of 28.45, (vi) B.Joarder of IISER Pune with ACPP of 23.80 in chemistry, (vii) H.W.Roesky of IISER Kolkata with ACPP of 23.50 in chemistry, (viii) B.S.Bhakuni of IISER Bhopal with ACPP of 21.80 in chemistry, (ix) S.K.Ghosh of IISER Pune with ACPP of 21.46 and (x) C.M.Reddy of IISER Kolkata with ACPP of 20.24 in chemistry.

The 88 authors in chemistry were in productivity range of 10-40 and contributed 1437 papers, with average productivity of 16.33, average citations per paper of 10.84, average h-index of 7.03 and average share of international collaborative papers of 16.70%.

The 32 authors in physics were in productivity range of 10-60 and contributed 505 papers, with average productivity of 15.78, average citations per paper of 4.34, average h-index of 4.31 and average share of international collaborative papers of 32.47%.

The 17 authors in life sciences were in productivity range of 10-28 and contributed 246 papers, with average productivity of 14.47, average citations per paper of 10.29, average h-index of 6.53 and average share of international collaborative papers of 25.61%.

The 11 authors in materials science were in productivity range of 10-33 and contributed 202 papers, with average productivity of 18.36, average citations per paper of 7.76, average h-index of 7.0 and average share of international collaborative papers of 13.37%.

The 5 authors in earth & planetary sciences were in productivity range of 10-14 and contributed 60 papers, with average productivity of 12.00, average citations per paper of 13.08, average h-index of 6.2 and average share of international collaborative papers of 80.00%.

4.7 Medium of Communication

The IISERs scholars had published 1102 papers in top 40 most productive journals as shown in Table 29. These 1102 papers constitute 43.35% share of the total output of IISERs during 2010-14. Most of these journals had high impact factor varying from 0.720 to 11.36. The publication share of individual IISER in these top 40 journals varied from 35.68 to 50.63: IISER Kolkata (35.68%), IISER Pune (47.14%), IISER Mohali (42.60%), IISER Bhopal (48.26) and IISER Thiruv (50.63). The largest number of papers (86) by IISERs were published in *Chemical Communications* (IF=6.718), followed by *Rsc Advances* (71 papers, IF=3.708), *Organic Letters* and *Crystengcomm* (42 papers each, IF=6.324 & 3.858), etc. The distribution of papers in these top 40 journals by individual IISER is also shown in Table 29.

Table 29. Distribution of Papers by IISERs in Top 40 Most Productive Journals during 2010-14

S.No	Name of the Journal	TP	IF 2013	IISER Kolkata	IISER Pune	IISER Mohali	IISER Bhopal	IISER Thiruv
1	Chemical	86	6.718	32	39	0	0	0

	Communication							
2	Rsc Advances	71	3.708	27	14	12	13	4
3	Organic Letters	42	6.324	1	19	3	18	1
4	Crystengcomm	42	3.858	18	5	4	11	4
5	Organic & Biomolecular Chemistry	39	3.487	10	15	3	9	2
6	PLOS One	39	3.534	9	10	9	9	2
7	Current Science	35	0.833	9	13	12	0	1
8	Physical Review B	35	3.664	5	8	7	4	12
9	Crystal Growth & Design	35	4.558	13	8	11	5	0
10	Journal of Physical Chemistry B	33	3.377	5	16	4	4	4
11	Physical Review D	33	4.864	10	6	4	4	9
12	Dalton Transactions	33	4.097	15	7	6	3	1
13	Applied Physics Letters	32	3.515	6	8	5	9	4
14	Physical Review A	32	2.991	7	13	9	0	3
15	Journal of Physical Chemistry C	31	4.835	11	7	0	1	12
16	Journal of Organic Chemistry	31	4.638	5	12	2	8	4
17	Physical Review E	28	2.326	3	14	9	1	1
18	Physical Chemistry Chemical Physics	28	4.198	6	10	2	5	5
19	Journal of Chemical Physics	27	3.122	11	8	7	0	1
20	Journal of Physical Chemistry A	25	2.775	6	6	7	3	3
21	Chemistry A European Journal	24	5.696	11	8	2	2	1
22	Angewandte Chemie International Edition	24	11.336	5	8	0	4	7
23	Tetrahedron Letters	23	2.39	7	4	3	9	0
24	Journal of Physical Chemistry Letters	22	6.687	0	8	2	1	11
25	Physical Review Letters	22	7.728	5	5	12	0	0
26	Journal of Applied Physics	22	2.185	8	6	3	3	2
27	Inorganic Chemistry	20	4.794	7	9	0	1	3
28	Atmospheric Chemistry & Physics	17	5.298	0	0	17	0	0
29	Journal of American Chemical Society	17	11.444	4	4	0	0	10
30	Journal of Molecular Structure	16	1.599	5	0	6	2	3
31	Journal of High Energy	16	6.220	4	6	0	5	1

	Physics							
32	Polyhedron	15	2.047	6	1	8	0	0
33	Pramana Journal of Physics	15	0.720	6	8	2	0	0
34	Soft Matter	14	4.151	7	3	1	3	0
35	Scientific Reports	14	5.078	3	4	2	6	0
36	Langmuir	14	4.384	7	3	0	3	1
37	Chemical Physics Letters	13	1.991	4	3	4	1	1
38	Inorganic Chimica Acta	13	2.041	7	2	2	2	0
39	Journal of Biological Chemistry	13	4.60	3	1	5	3	1
40	Journal of Cosmology & Astroparticle Physics	11	5.877	1	1	1	1	7
	Total of 40 journals	1102		309	322	186	153	121
	Total of all IISERs	2542		866	683	437	317	239
	Share of top 40 journals in total of IISERs	43.35		35.68	47.14	42.6	48.26	50.63

4.8 High Cited Papers

There were 50 higher cited papers by IISER scholars, which have received 50 or more citations (from 50 to 1080) since their publications till 15 September 2015. Of these 50 high cited papers, 41 papers received 50 to 100 citations, 7 papers 101-200 citations, 1 paper 401-500 citations and 1 paper 1001-1100 citations. These 50 high cited papers together received 5212 citations, leading to the average citation per paper of 104.24. The contribution of Individual IISER in these high cited papers was: IISER Kolkata (13 papers), IISER Pune (14 papers), IISER Mohali (10 papers), IISER Bhopal (8 papers) and IISER Thiruv (6 papers). The subject-wise break-up (according to SCOPUS classification) of these 50 high cited papers were: Chemistry (25), physics & astronomy and materials science (16 each), biochemistry, genetics & molecular biology (11), chemical engineering (9), engineering (5), medicine (3), earth & planetary science and pharmacology, toxicology & pharmaceuticals (1 each). Of the 50 high cited papers (43 articles and 7 reviews), 11 are single institution papers, 12 are national collaborative and 28 involve international collaboration. These 30 higher cited publications were published in 30 journals with highest number of papers (6) in *Physical Review Letters* (IF=7.728), *Organic Letters* (5 papers, IF=6.324), *Chemical Communications* (3 papers, IF=6.718), *Nature* (3 papers, IF=42.351), *Advanced Materials* (2 papers, IF=15.409), *Angewandte Chemie-International Edition* (2 papers, IF=11.336), *Crystal Growth & Design* (2 papers, IF=4.558), *CrysEngComm* (2 papers, IF=3.858), and 1 paper each in *Autophagy* (IF=11.423), *International Review of Immunology* (IF=5.28), *Chemical Reviews* (IF=45.66), *Immunity* (IF=19.748), *Nature Nanotechnology* (IF=33.265), *Nature Cell Biology* (IF=20.058), *Carbon* (IF=6.16), *Physical Review B* (IF=3.664), *Journal of Biomedical Optics* (IF=2.752), *Journal of Physical Chemistry Letters* (IF=6.687), *Tetrahedron Letters* (IF=2.391), *Stem Cells* (IF=7.133), *Journal of Biological Chemistry* (IF=4.60), *Journal of Solid State Chemistry* (IF=2.20), *Accounts of Chemical Research* (IF=24.348), *Journal of Organic Chemistry* (IF=4.638), *Journal of Materials Chemistry* (IF=6.626), *Journal of Physical Chemistry Chemical Physics* (IF=4.198), *Science* (IF=31.477), *ACS Nano* (IF=12.033), *Bulletin of Geological Society of*

America (IF=4.398), *Inorganic Chemistry* (IF=4.794) and *Cell* (IF=33.116). A list of top 9 papers receiving 100 Or more citations are shown in Appendix 1.

5. SUMMARY AND CONCLUSIONS

The individual cumulative publications of IISER varied from 239 to 866 and together published 2542 publications during five years from 2010-14. The five IISERs cumulative publications (2542) increased from 236 in 2010 to 756 in 2015, registering an annual growth rate of 34.92%. IISER Bhopal and IISER Pune registered higher annual average growth rates of 65.33% and 42.65%, compared to the lower growth rates of IISER Thiruv (32.50%), IISER Mohali (36.32%) and IISER Kolkata (23.64%) during 2010-14. The average citation impact per paper registered cumulative publications of five IISERs was 9.90, with highest (12.55) registered by IISER Thiruvananthapuram, followed by IISER Kolkata (12.50), IISER Bhopal (9.34). IISER Pune (7.77) and IISER Mohali (7.02) during 2010-14. The 82.29% of the publications of IISER Pune were cited once or more times, compared to IISER Bhopal (79.18%), IISER Kolkata (79.18%), IISER Tiruvanathapuram (76.99%) and IISER Mohali (76.89%) during 2010-14. IISER Thiruvananthapuram achieved the highest share (9.837%) of high cited papers among IISERs, followed by IISER Bhopal (0.631), IISER Kolkata (0.346), IISER Pune (0.293) and IISER Mohali (0.229) during 2010-14.

Only 33.39% of the cumulative publications of the five IISERs were involved in national collaboration, with highest share 35.33% coming from IISER Kolkata and the lowest (31.55% from IISER Bhopal during 2010-14. Only 30.80% of the cumulative publications of the five IISERs were involved in international collaboration, with highest share 39.75% coming from IISER- Thiruvananthapuram and the lowest (37.53% from IISER-Pune during 2010-14.

Chemistry, physics, materials science and biochemistry, genetics & molecular biology were the top preferred areas of research with institutional publications share of 43.94%, 34.19%, 24.86% and 19.71% during 2010-14. Chemical engineering, mathematics, medicine, engineering, agricultural & biological sciences and earth & planetary sciences (5.11%, 130) were the second choice with institutional publications share of 11.61%, 8.10%, 7.99%, 5.78% and 5.11% during 2010-14. Among significant keywords, the largest number of papers (114) were published on catalysis, followed by fluorescence (106), molecular models (105), density functional theory (70), DNA (69), crystal structure, genetics and quantum theory (62 each), polymers (62), chemical synthesis (60), protein expression (56), molecules (54), ligands, nanoparticles, NMR spectroscopy, peptides and thermodynamics (50 each), etc.

There were 153 significant authors in five IISERs publishing 10-60 publications and they together contributed 2446 publications with 96.22% share in the total output of IISERs during 2010-14. Amongst these 153 authors, 88 were in chemistry, 32 in physics, 17 in life sciences, 11 in materials science, 5 in earth & planetary sciences, 2 in engineering, 1 in immunology and 1 to miscellaneous during 2010-14. Of these 153 authors, 63 are affiliated to IISER Kolkata, 46 to IISER Pune, 16 to IISER Mohali, 18 to IISER Bhopal and 10 to IISER Thiruvananthapuram.

The five IISERs together published 1102 papers in top 40 most productive journals (with high impact factor varying from 0.720 to 11.36), which account for 43.35% share of the its total output during 2010-14. The publication share of individual IISER in these top 40 journals varied from 35.68 to 50.63: IISER Kolkata (35.68%), IISER Pune (47.14%), IISER Mohali (42.60%), IISER Bhopal (48.26) and IISER Thiruv (50.63).

There were 50 high cited papers (41 papers received 50 to 100 citations, 7 papers 101-200 citations, 1 paper 401-500 citations and 1 paper 1001-1100 citations) in IISERs cumulative output, which have received 50 or more citations and they together received 5212 citations, with average citation per paper

of 104.24. Among the 50 high cited papers, IISER Kolkata contributed 13 papers, followed by IISER Pune (14 papers), IISER Mohali (10 papers), IISER Bhopal (8 papers) and IISER Thiruv (6 papers) during 2010-14. Chemistry contributed the highest number (25) of high cited papers, followed by physics & astronomy and materials science (16 each), biochemistry, genetics & molecular biology (11), chemical engineering (9), engineering (5), medicine (3), earth & planetary science and pharmacology, toxicology & pharmaceuticals (1 each). Among the 50 high cited papers. 43 were articles and 7 reviews), 11 out of 50 high cited papers were single institution papers, 12 national collaborative and 28 involve international collaboration during 2010-14.

Table 24. Scientometric Profile of Most Productive Authors of IISER-Kolkata during 2010-14

S.No	Name	Affiliation	Subject	TP	TC	ACPP	HI	ICP	% ICP
1	P.K. Panigrahi	IISER Kolkata	Physics	60	196	3.27	9	22	36.67
2	S.S. Zade	IISER Kolkata	Chemistry	40	480	12	11	6	15
3	S. Banerjee	IISER Kolkata	Engineering/ Math	37	188	5.08	7	28	75.68
4	C.M.Reddy	IISER Kolkata	Chemistry	34	688	20.2	16	11	32.35
5	S.K. Mandal	IISER Kolkata	Chemistry	35	552	15.8	14	14	40
6	P.De	IISER Kolkata	Materials Sci/Chem	33	274	8.3	10	5	15.15
7	P.Purkayastha	IISER Kolkata	Chemistry	32	136	4.25	6	0	0
8	D. Halder	IISER Kolkata	Chem/Mate rials Sci	27	203	7.52	10	0	0
9	M. Pal	IISER Kolkata	Chem	25	331	13.2	11	1	4
10	B.Mukhopadh yay	IISER Kolkata	Chem	24	97	4.04	6	1	4.167
11	D.Rambabu	IISER Kolkata	Chem	24	323	13.5	11	0	0
12	N.Ghosh	IISER Kolkata	Phys	23	132	5.74	6	5	21.74
13	J.Dash	IISER Kolkata	Chem	22	283	12.9	9	8	36.36
14	T.K.Sen	IISER Kolkata	Chem	22	283	12.9	9	8	36.36
15	D.Koley	IISER Kolkata	Chem	21	232	11	9	9	42.86
16	S.K.Maity	IISER Kolkata	Chem/Mate rials	20	136	6.8	7	0	0
17	S.Bhattachary ya	IISER Kolkata	Materials/C hem	19	156	8.21	5	11	57.89
18	V.Mahalinga m	IISER Kolkata	Chem	19	208	10.9	9	3	15.79
19	C.Malla Ready	IISER Kolkata	Chem	18	144	8	8	1	5.556
20	C.Mitra	IISER Kolkata	Physics/Mat erials	18	69	3.83	6	3	16.67
21	G.R.Krishna	IISER Kolkata	Chem	17	296	17.4	9	3	17.65
22	A.Maity	IISER Kolkata	Chem	17	71	4.18	5	0	0
23	P.Jena	IISER Kolkata	Chem	17	148	8.71	8	0	0
24	R. Shunmugham	IISER Kolkata	Materials/C hem	16	134	8.38	7	0	0
25	S.Maity	IISER Kolkata	Chem	16	181	11.3	10	0	0

26	T. Das	IISER Kolkata	Chem	16	70	4.38	5	0	0
27	S.Bagchi	IISER Kolkata	Chem	15	51	3.4	4	0	0
28	G.Rama Krishna	IISER Kolkata	Chem	15	172	11.5	8	1	6.667
29	A K. Tiwari	IISER Kolkata	Chem	14	67	4.79	5	4	28.57
30	S.Dasgupta	IISER Kolkata	Geology	14	241	17.2	8	11	78.57
31	H.Singh	IISER Kolkata	Physics	14	33	2.36	3	2	14.29
32	T.Chakraborty	IISER Kolkata	Physics	14	33	2.36	3	2	14.29
33	T.S.Raju	IISER Kolkata	Physics	14	50	3.57	4	3	21.43
34	P.Gupta	IISER Kolkata	Chem	13	48	3.69	4	1	7.692
35	A.Pradhan	IISER Kolkata	Physics	13	20	1.54	2	6	46.15
36	K. Mandal	IISER Kolkata	Engineering	13	54	4.15	3	9	69.23
37	S.Pal	IISER Kolkata	Physics	12	13	1.08	2	5	41.67
38	P.B.Pati	IISER Kolkata	Chem	12	109	9.08	6	2	16.67
39	S.G.Roy	IISER Kolkata	Materials/Chem	12	167	13.9	8	0	0
40	S.Mandal	IISER Kolkata	Chem	12	46	3.83	4	1	8.333
41	A.Mukherjee	IISER Kolkata	Chem	12	213	17.8	8	6	50
42	C.Hazara	IISER Kolkata	Chem	12	98	8.17	6	1	8.333
43	A.Ghosh	IISER Kolkata	Physics	12	13	1.08	2	5	41.67
44	J.Soni	IISER Kolkata	Physics	12	40	3.33	4	3	25
45	J. Das Sarma	IISER Kolkata	Materials/Medicine	12	95	7.92	5	3	25
46	S.Bandyopadhyay	IISER Kolkata	Chem	12	91	7.58	5		0
47	H.W.Roesky	IISER Kolkata	Chem	12	282	23.5	7	12	100
48	A.Sarkar	IISER Kolkata	Chem	12	44	3.67	4	0	0
49	S. Raj	IISER Kolkata	Phys	12	13	1.08	2	5	41.67
50	A.Bedi	IISER Kolkata	Chem	12	65	5.42	5	0	0
51	S.Pal	IISER Kolkata	Materials	12	71	5.92	5	1	8.333
52	D.Nandy	IISER Kolkata	Earth	11	119	10.8	5	8	72.73
53	P.K.Ghorai	IISER Kolkata	Chem	11	119	10.8	6	5	45.45
54	S.Sarkar	IISER Kolkata	Chem	11	124	11.3	7	0	0
55	S.Bera	IISER Kolkata	Chem	11	33	3	3	0	0
56	S.Roy	IISER Kolkata	Chem	11	67	6.09	5	6	54.55
57	J.Hatai	IISER Kolkata	Chem	10	90	9	5	0	0
58	A.K.Roy	IISER Kolkata	Phys	10	24	2.4	3	0	0
59	S.Panda	IISER Kolkata	Chem	10	60	6	4		0
60	N.Kedia	IISER Kolkata	Chem	10	34	3.4	4		0
61	B.Bansal	IISER Kolkata	Physics	10	19	1.9	3	6	60
62	S.Dattagupta	IISER Kolkata	Physics	10	33	3.3	4	4	40
63	P.Bhadury	IISER Kolkata	Biology	10	30	3	2	5	50

Table 25. Scientometric Profile of Most Productive Authors of IISER-Pune during 2010-14

S.No	Name	Affiliation	Subject	TP	TC	ACPP	HI	ICP	% ICP
1	S.K.Ghosh	IISER Pune	Chem	24	515	21.46	11	6	25.00
2	N.K. Subhedar	IISER Pune	Neur	28	249	8.893	10	4	14.29
3	M.Jayakannan	IISER Pune	Mat	23	185	8.043	8	1	4.348
4	H. Chakrapani	IISER Pune	Bioc	23	174	7.565	8	8	34.78
5	H.N. Gopi	IISER Pune	Chem	23	142	6.174	8	2	8.696
6	N Ballav	IISER Pune	Chem	22	137	6.227	7	15	68.18
7	N Dahanukar	IISER Pune	Biol	21	60	2.857	4	8	38.10
8	D.M Kokare	IISER Pune	Neur	20	219	10.95	10	2	10.0
9	M.Jaganmohan	IISER Pune	Chem	20	569	28.45	13	0	0.00
10	P.Talukdar	IISER Pune	Chem	19	234	12.32	7	2	10.53
11	A.Y. Khare	IISER Pune	Phys	18	67	3.722	5	14	77.78
12	P.Hazare	IISER Pune	Chem	17	116	6.824	8	0	0.00
13	A.Venkatnathan	IISER Pune	Chem	17	95	5.588	6	0	0.00
14	T.S.Mahesh	IISER Pune	Phys	17	80	4.706	6	3	17.65
15	S.K.Kulkarni	IISER Pune	Phys	20	150	7.5	6	9	45.00
16	A.Sengupta	IISER Pune	Chem	16	105	6.563	7	0	0.00
17	B. Joarder	IISER Pune	Chem	15	357	23.8	8	4	26.67
18	G,V. Kumar	IISER Pune	Phys	14	110	7.857	7	0	0.00
19	A.K. Chaudhari	IISER Pune	Chem	14	445	31.79	10	3	21.43
20	S.Hotha	IISER Pune	Chem	14	127	9.071	7	2	14.29
21	S.G.Srivatsan	IISER Pune	Chem	14	162	11.57	8	1	7.143
22	K.N.Ganesh	IISER Pune	Chem	13	78	6	5	0	0.00
23	R. Boomishankar	IISER Pune	Chem	12	54	4.5	5	2	16.67
24	G.Ambika	IISER Pune	Phys	12	99	8.25	5	1	8.333
25	R.Raghavan	IISER Pune	Biol	12	41	3.417	4	6	50.00
26	S.S.Nagarkar	IISER Pune	Chem	12	420	35	9	0	0.00
27	K.T.Nakhate	IISER Pune	Neur	12	136	11.33	8	1	8.333
28	A. Das	IISER Pune	Chem	12	76	6.333	6	4	33.33
29	D.Khand	IISER Pune	Chem	12	154	12.83	6	1	8.333
30	S.Galande	IISER Pune	Bioc	11	164	14.91	8	4	36.36
31	T.A.Jung	IISER Pune	Chem	11	105	9.545	6	11	100
32	T.Saha	IISER Pune	Chem	11	86	7.818	5	2	18.18
33	C.Wackerlin	IISER Pune	Chem	11	105	9.545	6	11	100
34	K.Gawala	IISER Pune	Chem	11	50	4.545	4	0	0.00
35	S.V. Jadhav	IISER Pune	Chem	11	75	6.818	5	1	9.091
36	M.A.Upadhya	IISER Pune	Neur	11	101	9.182	7	0	0.00
37	S.Ananth	IISER Pune	Phys	11	21	1.909	3	2	18.18
38	P.S.Singru	IISER Pune	Neur	10	133	13.3	8	3	30.0
39	S.Datta	IISER Pune	Phys	10	36	3.6	5	1	10.0
40	M.S.Santhanam	IISER Pune	Phys	10	28	2.8	3	0	0.0
41	A.Saxena	IISER Pune	Phys	10	33	3.3	4	10	100
42	A.Mukherjee	IISER Pune	Chem	10	112	11.2	6	2	20.0
43	S.M.Mali	IISER Pune	Chem	10	74	7.4	5	1	10.0
44	R.Attreya	IISER Pune	Earth	12	68	5.667	6	9	75.0

45	A.Bandyopadhyay	IISER Pune	Chem	10	92	9.2	7	1	10.0
46	P.Ghosh	IISER Pune	Mate	10	77	7.7	5	3	

Table 26. Scientometric Profile of Most Productive Authors of IISER-Mohali during 2010-14

S.No	Name	Affiliation	Subject	TP	TC	ACPP	HI	ICP	%ICP
1	S.Sinha	IISER Mohali	Phys	25	122	4.88	6	10	40
2	S.Khullar	IISER Mohali	Chem	21	72	3.43	5	0	0.00
3	N.Sathyamurthy	IISER Mohali	Chem	18	98	5.44	5	6	33.33
4	S.K. Mandal	IISER Mohali	Chem	22	72	3.27	5	0	0.00
5	S.A.Babu	IISER Mohali	Chem	17	116	6.82	2	0	0.00
6	K.P.Singh	IISER Mohali	Phys	14	44	3.14	3	2	14.29
7	A.R.Choudhury	IISER Mohali	Chem	13	175	13.46	6	5	38.46
8	V.Sinha	IISER Mohali	Earth	13	174	13.38	6	10	76.92
9	S.Mukhopadhyay	IISER Mohali	Bioc	13	138	10.62	6	1	7.692
10	N,G.Prasad	IISER Mohali	Bioc	12	71	5.92	5	2	16.67
11	A.K.Bachhawat	IISER Mohali	Bioc	12	85	7.08	6	5	41.67
12	S.K.Pal	IISER Mohali	Chem	12	54	4.50	4	3	25.00
13	R.Kochhar	IISER Mohali	Hist	11	3	0.27	1	0	0.00
14	K. Dorai	IISER Mohali	Chem	11	39	3.54	4	1	9.091
15	B.Sinha	IISER Mohali	Earth	10	183	18.3	6	10	100
16	Y.Singh	IISER Mohali	Phys	10	414	41.4	7	9	90.00

Table 27. Scientometric Profile of Most Productive Authors of IISER-Bhopal during 2010-14

S.No	Name	Affiliation	Subject	TP	TC	ACPP	HI	ICP	%ICP
1	D.Chopra	IISER Bhopal	Chem	28	446	15.93	12	8	28.57
2	V.K.Singh	IISER Bhopal	Chem	24	470	19.58	11	0	0.00
3	D.S.Rana	IISER Bhopal	Phys	19	25	1.316	3	2	10.53
4	K,V.Adarsh	IISER Bhopal	Phys	17	78	4.588	5	6	35.29
5	S.Kumar	IISER Bhopal	Chem	17	275	16.18	9	3	17.65
6	R.S.Tomar	IISER Bhopal	Bioc	16	110	6.875	8	2	12.5
7	R.Rana	IISER Bhopal	Phys	16	24	1.5	3	2	12.5
8	A.Bisai	IISER Bhopal	Chem	15	253	16.87	7	0	0.00
9	S.Mukherjee	IISER Bhopal	Chem	15	156	10.4	7	0	0.00
10	U.Anand	IISER Bhopal	Chem	14	155	11.07	7	0	0.00
11	P.Pandey	IISER Bhopal	Phys	14	23	1.643	3	1	7.143
12	G.K.Azad	IISER Bhopal	Bioc	14	102	7.286	7	2	14.29
13	P.Panini	IISER Bhopal	Chem	14	117	8.357	7	6	42.86
14	S.J.Balakrishna	IISER Bhopal	Chem	13	228	17.54	8	3	23.08
15	R.Mahalakshmi	IISER Bhopal	Bioc	11	46	4.182	4	0	0.00
16	H.Kumar	IISER Bhopal	Immu	10	673	67.3	6	10	100
17	J.Sankar	IISER Bhopal	Chem	10	37	3.7	4	1	10.0
18	B.S.Bhakuni	IISER Bhopal	Chem	10	218	21.8	8	1	10.0

Table 28. Scientometric Profile of Most Productive Authors of IISER-Thiruv during 2010-14

S.No	Name	Affiliation	Subject	TP	TC	ACPP	HI	ICP	%ICP
1	A.Datta	IISER Thiruv	Chem	28	397	14.18	12	0	0.00
2	M,Hariharan	IISER Thiruv	Chem	21	150	7.143	7	10	47.619 05
3	K.M.Sureshan	IISER Thiruv	Chem	20	163	8.15	7	1	5.00
4	S.Shankaranaryanan	IISER Thiruv	Phys	20	35	1.75	4	8	40.0
5	E.D.Jemmis	IISER Thiruv	Chem	17	198	11.65	10	7	41.17
6	R.Nath	IISER Thiruv	Phys	14	116	8.286	7	13	92.86
7	D. Jose	IISER Thiruv	Chem	13	235	18.08	7	0	0.00
8	F.D.Lewis	IISER Thiruv	Chem	10	105	10.5	6	10	100
9	R.S.Swathi	IISER Thiruv	Chem	10	73	7.3	5	0	0.00
10	A.K.Jissy	IISER Thiruv	Chem	10	114	11.4	6	0	0.00

sAppendix 1

List of Top 9 High Cited Articles

1, Klionsky, D.J., et al .Guidelines for the use and interpretation of assays for monitoring autophagy (Review) (2012)*Autophagy*,8(4),pp.445-544.**Cited 1080 times.**

[b. IISER-Thiruvananthapuram et al]

2. Kumar, H., Kawai, T., Akira, S. Pathogen recognition by the innate immune system (Article) (2011)*International Reviews of Immunology*,30(1),pp.16-34.**Cited 480 times.**

[^bLaboratory of Immunology, Department of Biological Sciences, Indian Institute of Science Education and Research (IISER) Bhopal, Govindpura, Bhopal 460 023, India]

3. Ogale, S.B. Dilute doping, defects, and ferromagnetism in metal oxide systems (Review)(2010)*Advanced Materials*,2(29),pp.3125-3155.**Cited 173 times.**

[^bIndian Institute of Science Education and Research (IISER), Pune, India]

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[a. Indian Institute of Science Education and Research (IISER), Dr. Homi Bhabha Road, Pashan, Pune-411008, India]

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