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Scientometric Portrait of Prof. Dipankar Das Sarma, Solid State & Structural Chemistry Unit, Indian Institute of Science, Bengaluru

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Abstract

The paper attempts to analyse the research contribution of Professor Dipankar Das Sarma, formerly J.N. Tata Chair Professor, SSCU, Indian Institute of Science, Bengaluru as obtained from Scopus & Web of Science (WoS) database. In total of 42 productive years, he has 482 publications and 10 patents (up to September 2020) and highest number of articles were published in the year 2016 with 20 articles at the age of 61. He has h-index of 70 as per Scopus. His publications during 1979-2020 were analyzed by publication productivity, authorship pattern, scattering of publications and the keywords used in the titles of his papers.

Keywords : Scientometric portrait, Publication productivity, Research collaboration, Collaborator dynamics, channels of communication, Structural Chemistry

1. Introduction

Man's quest for understanding the fundamentals of nature led to Science. Over the years many branches and subbranches have been developing as research becomes more complex and interdisciplinary. India has its own share in contributing to world's Science & Technology research. Individual Researchers contribute to the pool in their own way. Scientometric analysis of individual scientists is one way of appreciating their contribution and provide a deeper view of the journey. In this article, an attempt has been made to map the contributions of Professor Dipankar Das Sarma, Solid State & Structural Chemistry Unit, Indian Institute of Science, Bengaluru.

2. Brief profile of Prof. D. D. Sarma

Prof. D.D Sarma was born on September 15, 1955. He obtained MSc (Five-year Integrated course) from IIT Kanpur in 1977 and PhD from IISc in 1982. He joined IISc as Lecturer in 1986 and moved up the ladder to become Professor in the year 1999. His research interests include Condensed Matter Physics, Solid State Chemistry, Materials Science, Spectroscopy, Nanoscience and Energy Science. He has published 482+ articles and has guided 33+ students in their Doctorate studies among which about 44% have received best Thesis award. He continues to guide another 10+ students. He has been recipient of several prestigious awards including the Shanti Swarup Bhatnagar Award in Chemistry (1994), UGC National Hari Om Ashram Trust Award etc. and has completed projects worth crores of rupees. More details are listed in Appendix .

3. Objectives

The main objectives of the study is to analyse the research contributions of Prof. D D. Sarma

- To identify year-wise growth of publications, fifty percentile age etc.
- To identify preferred Journals and Impact Factor (IP)
- To identify authorship pattern (Single and multiple) and collaborative research
- To identify Highly Cited papers and Citations
- To identify keywords and frequency of usage in article titles

4. Literature review

While many articles on Scientometric portrait of individual scientists have been published, Kalyane and Kalyane (1993) seems to have first used the phrase 'Scientometric Portrait' to carry out bio-bibliometric studies on scientists. The references cited from Sl.No 3-11 are examples of such studies.

5. Methodology

The list of publications was obtained both from Web of Science and Scopus databases by searching for Sarma DD in Author field. The downloaded list as excel file from both the databases was merged, duplicates were identified and removed to get a single complete list. The reason for using both the databases was to get complete list. However, when the list was compared with Author's actual list, there were many articles which were not indexed in either of the databases. It means,

databases do not necessarily index all the publications. MS excel tools were used to compile the data as required for analysis in the paper.

6. Data analysis and discussion

6.1 Productivity

Table-1: Year wise distribution of publications

Year	Publications	Percentage	Cumulative No. of Publications	Cumulative Percentage	Biological Age	Productive Age	Citations
1979	1	0.21	1	0.21	24	1	-
1980	5	1.07	6	1.28	25	2	474
1981	4	0.85	10	2.13	26	3	89
1982	8	1.71	18	3.84	27	4	144
1983	4	0.85	22	4.69	28	5	1
1984	6	1.28	28	5.97	29	6	82
1985	9	1.92	37	7.89	30	7	128
1986	8	1.71	45	9.59	31	8	155
1987	11	2.35	56	11.94	32	9	313
1988	15	3.20	71	15.14	33	10	556
1989	15	3.20	86	18.34	34	11	439
1990	7	1.49	93	19.83	35	12	147
1991	7	1.49	100	21.32	36	13	78
1992	11	2.35	111	23.67	37	14	496
1993	9	1.92	120	25.59	38	15	408
1994	12	2.56	132	28.14	39	16	528
1995	6	1.28	138	29.42	40	17	385
1996	17	3.62	155	33.05	41	18	648
1997	11	2.35	166	35.39	42	19	283
1998	12	2.56	178	37.95	43	20	507
1999	7	1.49	185	39.45	44	21	315
2000	8	1.71	193	41.15	45	22	1111
2001	15	3.20	208	44.35	46	23	917
2002	13	2.77	221	47.12	47	24	386
2003	16	3.41	237	50.53	48	25	525
2004	9	1.92	246	52.45	49	26	1105
2005	17	3.62	263	56.08	50	27	633
2006	15	3.20	278	59.28	51	28	409
2007	17	3.62	295	62.90	52	29	868
2008	14	2.99	309	65.88	53	30	459
2009	15	3.20	324	69.08	54	31	536
2010	16	3.41	340	72.49	55	32	918
2011	16	3.41	356	75.91	56	33	482

2012	11	2.35	367	78.25	57	34	355
2013	11	2.35	378	80.60	58	35	270
2014	17	3.62	395	84.22	59	36	209
2015	14	2.99	409	87.21	60	37	345
2016	20	4.26	429	91.47	61	38	450
2017	13	2.77	442	94.24	62	39	231
2018	16	3.41	458	97.65	63	40	108
2019	8	1.71	466	99.36	64	41	22
2020	3	0.64	469	100.00	65	42	-
	469						

Note : Table 1 includes Journal articles, Conference papers, Reviews, Letters and Book chapters.

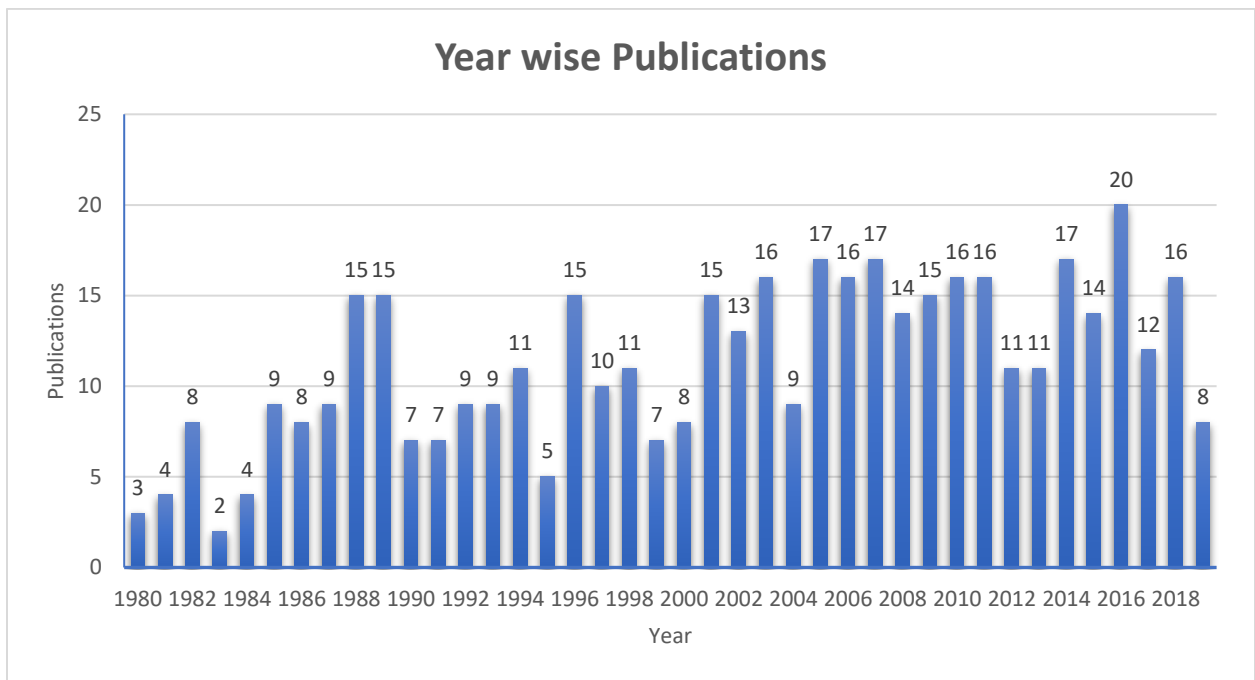


Figure 1 : Year wise Publications

Table 1 and Figure 1 shows year-wise publications of Prof. D.D. Sarma. As on September 1, 2020, in total 42 productive years, he has published 469 articles and highest number of articles were published in the year 2016 with 20 articles at the age of 61. There have been no gaps since first article published in the year 1979. He has three peaks with 17 publications in the year 1996 (age 41), 2005 (age 50) and 2014 (age 59) respectively.

Fifty percentile age

This refers to the number of years during which 50% of the papers were published from the first year of publication of paper. For Prof D.D. Sarma, it is 25 years as he published 237 papers in total by the end of 2003 with his first paper being published in the year 1979.

Productivity coefficient

The ratio of 50 percentile age to the total productivity age.

$$25/42=0.59$$

Average Yearly Contributions

It is the ratio of Total contribution/Total productivity age

$$469/42=11.2$$

It means, on an average, 11 papers have been published in a year.

Productivity life (age)

This refers to the count from the year in which the first paper was published by the author till the latest year of publication. Prof. D.D. Sarma’s productive life is 42 years

Peak Productivity Age

As seen from Table 1, Prof. Sarma’s peak productive age is 61 years when he published 20 articles in the year 2016

Productivity Coefficient (PC)

PC = Chronological age of last publication/Chronological age of fifty percentage

$$65/48= 1.35$$

6.2 Type of Documents

Table 2 : Type of documents

Document type	Number	Percentage
Article	420	87
Conference Paper	31	7
Review	10	2
Erratum	8	1.4
Letter	6	1.2
Book Chapter	2	0.4
Editorial	2	0.4

Note	2	0.4
Short Survey	1	0.2
Total	482	

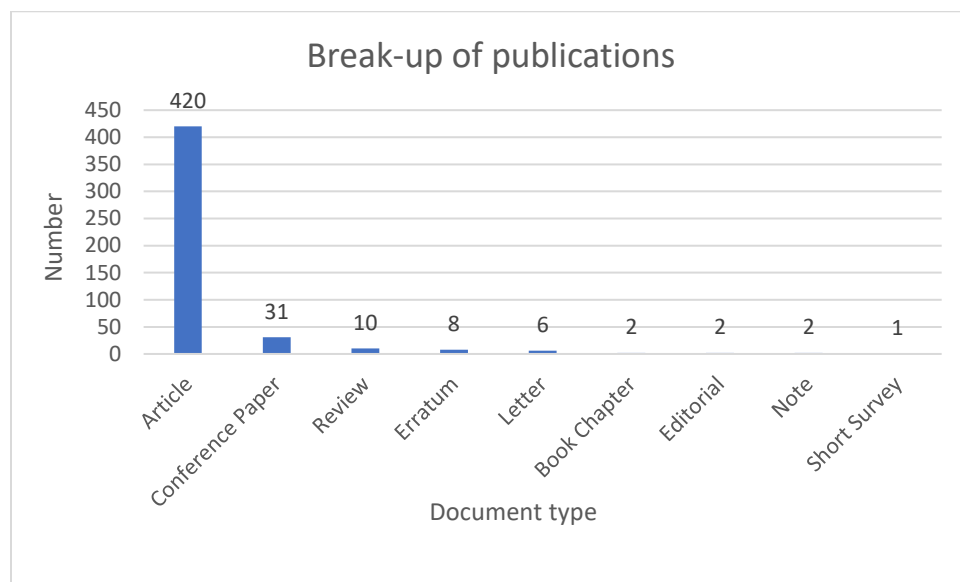


Figure 2 : Break-up of publications

Table 2 and Figure 2 shows the break-up of different document types in which Prof. D.D. Sarma has published research communications. Maximum number of publications i.e 87% are in Journal articles followed by Conference papers with 7% and review at 2%.

6.3 Channels of Communication

Table 3 : Scattering of Publications in Journals

Rank	Source title	No of articles	Percent	Cumulative Articles	FPY	LPY	IF(2019) WoS
1	Physical Review B	129	27.51	129	1982	2019	3.575
2	Physical Review Letters	34	7.25	163	1986	2016	8.385
3	Journal of Physical Chemistry Letters	15	3.20	178	2010	2018	6.71
4	Journal of Physics Condensed Matter	15	3.20	193	1989	2014	2.707
5	Applied Physics Letters	12	2.56	205	1986	2013	3.579
6	Solid State Communications	11	2.35	216	1988	2013	1.521
7	Epl	10	2.13	226	1988	2018	1.958

8	Journal of Physical Chemistry C	11	2.35	237	2007	2018	4.189
9	ACS Energy Letters	8	1.71	245	2016	2019	19.003
10	Aip Conference Proceedings	8	1.71	253	2007	2011	NA
11	Journal of Electron Spectroscopy and Related Phenomena	8	1.71	261	1980	2015	1.468
12	Journal of Magnetism and Magnetic Materials	8	1.71	269	1985	2016	2.717
13	Journal of Nanoscience and Nanotechnology	8	1.71	277	2003	2009	1.134
14	Chemical Physics Letters	7	1.49	284	1980	2013	2.029
15	Journal of The American Chemical Society	7	1.49	291	1987	2011	14.612
16	Pramana Journal of Physics	7	1.49	298	1983	2009	1.688
17	Journal of Solid State Chemistry	6	1.28	304	1982	2000	2.726
18	Proceedings of The Indian Academy Of Sciences Chemical Sciences	6	1.28	310	1981	2003	0.921
19	Journal of Applied Physics	5	1.07	315	1988	2019	2.286
20	Journal of Physical Chemistry B	5	1.07	320	2004	2014	2.857
21	Surface Science	5	1.07	325	1985	2014	1.466
22	Zeitschrift Fur Physik B Condensed Matter	5	1.07	330	1985	1990	NA
	Other Journals with 1,2,3 & 4 Articles	139	0.21	469			

FPY means First Paper year, LPY means Last Paper year

IF : Impact Factor obtained from Web of Science database for the year 2019

Table 3 shows the list of Journals having at least five or more articles ranked by Journal with maximum number of papers . Prof. Sarma has published papers in 110 different Journals. In the top 3 ranks, Physical Review B stands First with 129 papers (27.5 %), followed by Physical Review Letters with 34 articles (7.25 %) and Journal of Physical Chemistry Letters & Journal of Physics Condensed Matter with 15 article (3.2 %) respectively. Authors do have their favorite journals and keep publishing in them.

Publication concentration

It is the ratio in percentage of the number of channels accounting for half of the papers to the total number of channels used
 $PC = 8/110 * 100 = 7.27$

Publication Density

It is the ratio of total number of papers published to the total number of channels used
 $PD = 469/110 = 4.26$

6.4 Collaborations

Table 4 Collaborations

No of Authors (a)	Contributions (b)	%	Authorships $T=a*b$	Cumulative contributions	%	Authorships $T=a*b$	Cumulative	%
1-authored	8	1.71	8	8	1.71	8	8	0.30
2-authored	58	12.37	116	66	14.07	116	124	4.35
3-authored	80	17.06	240	146	31.13	240	364	9.01
4-authored	70	14.93	280	216	46.06	280	644	10.51
5-authored	61	13.01	305	277	59.06	305	949	11.44
6-authored	41	8.74	246	318	67.80	246	1195	9.23
7-authored	41	8.74	287	359	76.55	287	1482	10.77
8-authored	32	6.82	256	391	83.37	256	1738	9.61
9-authored	20	4.26	180	411	87.63	180	1918	6.75
10-authored	11	2.35	110	422	89.98	110	2028	4.13
11-authored	17	3.62	187	439	93.60	187	2215	7.02
12-authored	7	1.49	84	446	95.10	84	2299	3.15
13-authored	5	1.07	65	451	96.16	65	2364	2.44
14-authored	4	0.85	56	455	97.01	56	2420	2.10
15-authored	5	1.07	75	460	98.08	75	2495	2.81
16-authored	1	0.21	16	461	98.29	16	2511	0.60
17-authored	3	0.64	51	464	98.93	51	2562	1.91

18-authored	1	0.21	18	465	99.15	18	2580	0.68
19-authored	1	0.21	19	466	99.36	19	2599	0.71
20-authored	2	0.43	40	468	99.79	40	2639	1.50
21-authored	0	0.00	0	468	99.79	0	2639	0.00
22-authored	0	0.00	0	468	99.79	0	2639	0.00
23-authored	0	0.00	0	468	99.79	0	2639	0.00
24-authored	0	0.00	0	468	99.79	0	2639	0.00
25-authored	0	0.00	0	468	99.79	0	2639	0.00
26-authored	1	0.21	26	469	100.00	26	2665	0.98
Total	469	100	2665	469	100.00	2665		100.00

Note : In the contributions (b), wherever there is zero, it means, there were no papers with such collaborations. For example, there are no papers with 21 authors.

Table 4 shows that Prof. Sarma had collaboration with as many as 2665 authorships. While there are no papers with 21, 22, 23, 24 and 25 authors there are papers with other numbers from one to 26 authors. Among the 2665 collaborations, 8 are one authored (0.3 %), 116 (4.35 %) are two-authored, 240 (9.01 %) are three-authored, 280 (10.51 %) are four-authored and 305 (11.44 %) are five-authored.

Highest collaboration is for five-authored productivity i.e 305 (11.44 %). For about 60 % of articles, the collaborations were from high productive categories (3 to 8 authored) while the remaining contributed for 40 % of articles.

Table 5 : Publication productivity of Prof. DD Sarma

S.No	Year	Single and Multiple authors						MP	TP	BA
		1	2	3	4	5	>5			
1	1979	0	0	0	1	0	0	1	1	24
2	1980	1	1	2	0	0	1	4	5	25
3	1981	1	0	1	0	0	2	3	4	26
4	1982	0	3	4	0	1	0	8	8	27
5	1983	1	1	2	0	0	0	3	4	28
6	1984	0	2	3	1	0	0	6	6	29
7	1985	0	0	3	0	5	1	9	9	30

8	1986	0	2	1	2	3	0	8	8	31
9	1987	0	3	2	6	0	0	11	11	32
10	1988	1	2	4	2	1	5	14	15	33
11	1989	0	3	2	4	3	3	15	15	34
12	1990	1	2	0	1	0	3	6	7	35
13	1991	0	1	2	3	0	1	7	7	36
14	1992	0	1	3	3	1	3	11	11	37
15	1993	0	0	3	1	2	3	9	9	38
16	1994	0	3	5	0	1	3	12	12	39
17	1995	0	1	1	2	1	1	6	6	40
18	1996	2	1	2	5	3	4	15	17	41
19	1997	0	0	3	2	1	5	11	11	42
20	1998	0	3	1	2	2	4	12	12	43
21	1999	0	2	2	1	0	2	7	7	44
22	2000	0	2	1	1	2	2	8	8	45
23	2001	1	3	2	1	4	4	14	15	46
24	2002	0	1	4	2	0	6	13	13	47
25	2003	0	2	2	0	1	11	16	16	48
26	2004	0	2	1	0	1	5	9	9	49
27	2005	0	3	1	2	4	7	17	17	50
28	2006	0	2	2	2	3	6	15	15	51
29	2007	0	3	3	1	3	7	17	17	52
30	2008	0	0	6	2	1	5	14	14	53
31	2009	0	2	1	4	2	6	15	15	54
32	2010	0	0	1	6	1	8	16	16	55
33	2011	0	1	3	2	2	8	16	16	56
34	2012	0	1	1	1	2	6	11	11	57

35	2013	0	0	0	3	2	6	11	11	58
36	2014	0	1	1	2	2	11	17	17	59
37	2015	0	1	1	1	1	10	14	14	60
38	2016	0	1	4	1	0	14	20	20	61
39	2017	0	0	1	2	2	8	13	13	62
40	2018	0	1	0	0	2	13	16	16	63
41	2019	0	0	0	1	1	6	8	8	64
42	2020	0	1	0	0	0	2	3	3	65
Total		8	60	84	74	65	195	461	469	

MP : Multi authored papers, TP : Total number of publications, BA : Biological age of author

Table 5 shows the publication productivity from the year 1979 to 2020 (incomplete year). Out of the 469 papers analysed, 8 were single authored (1.7%), 60 two-authored works (12.7%), 84 three-authored (17.9%), 74 four-authored (15.7%), 65 five-authored (13.8%) and 195 articles with more than five authors (41.5%) respectively.

Degree of Collaboration

As per the formula given by Subramanyam (1982)

Degree of collaboration $C = Nm/Nm+N_s$

C = Degree of collaboration, N_m = Number of Multiple authors, N_s = Number of Single authors

$$C = 461/469 = 0.98$$

Collaborative Co-efficient (CC)

It is the ratio of number of collaborative papers to the number of papers published during a fixed period of time

$$CC = 461/469 = 0.98$$

Table 6: Authorship status

Author position	Frequency	Cumulative Freq	%
1-author	79	79	16.84
2-author	88	167	18.76

3-author	72	239	15.35
4-author	56	295	11.94
5-author	47	342	10.02
6-author	28	370	5.97
7-author	30	400	6.40
8-author	18	418	3.84
9-author	15	433	3.20
10-author	7	40	1.49
11-author	10	450	2.13
12-author	5	455	1.07
13-author	4	459	0.85
14-author	1	460	0.21
15-author	3	463	0.64
16-author	1	464	0.21
17-author	2	466	0.43
18-author	2	468	0.43
19-author	0	468	0.00
20-author	1	469	0.21
21-author	0	469	0.00
22-author	0	469	0.00
23-author	0	469	0.00
24-author	0	469	0.00
25-author	0	469	0.00
26-author	0	469	0.00

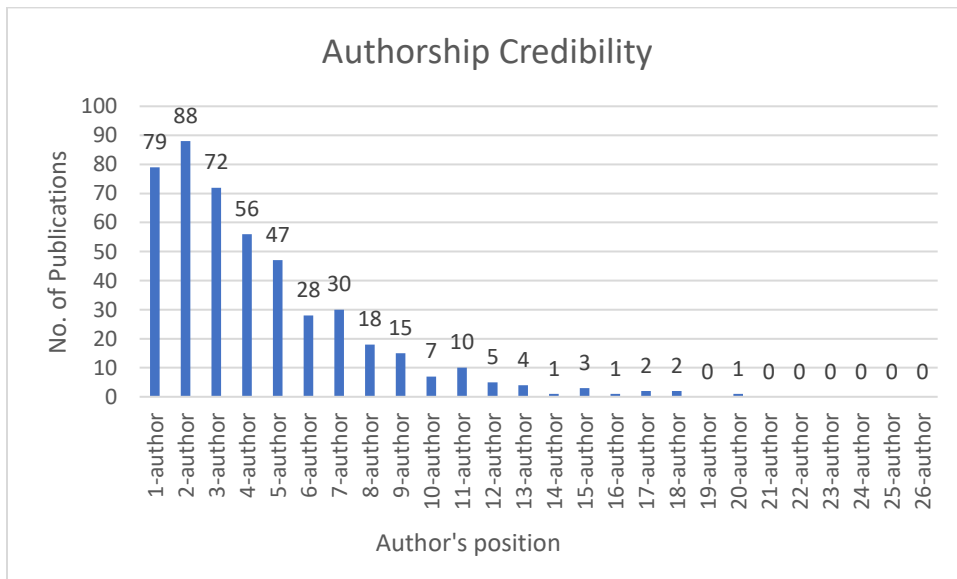


Figure 3 : Authorship Credibility

Table 6 and Figure 3 shows the position of Author (1st, 2nd, 3rd etc.). As seen from the table, the credibility of 79 (16.84 %) as First author, 88 (18.76 %) as second author, 72 (15.35 %) as third author, 56 (11.94 %) as fourth author and 47 (10.02 %) as fifth author contribute to about 73 % of the articles. For remaining positions, the percentage is less than 10 %.

Core collaborators: Those authors who have made substantial contributions (in terms of number of papers) in association with the principal author.

Table 7 : Co-authors list having 20 or more articles

S.No	Author name	Publications	FPY	LPY	Total Years
Mentor	Sarma, D.D.	469	1979	2020	42
1	Mahadevan, P	48	1994	2018	25
2	Rao, C.N.R.	47	1979	2013	35
3	Ray, S	35	1999	2016	18
4	Sapra, S	23	2000	2010	11
5	Carbone, C	22	1985	2006	22
6	Fujimori, A	21	1996	2014	19
7	Chainani, A	20	1990	2015	26
8	Kumar, A	20	1999	2019	21
9	Nag, A	20	2007	2017	11
10	Shanthi, N	20	1996	2002	7

FPY : First Paper year, LPY : Last Paper Year

Table 7 shows the number of Co-authors having authored 20 or more articles with Prof. Sarma. As the number of co-authors is more than 150, the analysis has been limited to co-authors having 20 or more articles. Of the 10 co-authors, the most active researcher was Prof Mahadevan P who shares the highest number of publications with 48 followed by Prof. C.N.R. Rao with 47 publications and Prof Ray S with 35 publications respectively.

6.5 Research-Affiliation

Table 8 : Affiliations associated

S.No	Affiliation	No. of papers
1	Jawaharlal Nehru Centre for Advanced Scientific Research	107
2	Indian Association for the Cultivation of Science	85
3	Forschungszentrum Jülich FZJ	46
4	S N Bose National Centre for Basic Science	42
5	Council of Scientific and Industrial Research India	41
6	Uppsala Universitet	35
7	University of Tokyo	27
8	INFN, Laboratori Nazionali Di Frascati	20
9	Consiglio Nazionale delle Ricerche	19

10	Tata Institute of Fundamental Research, Mumbai	18
11	European Synchrotron Radiation Facility	18
12	Helmholtz-Zentrum Berlin für Materialien und Energie HZB	17
13	Università degli Studi di Roma La Sapienza	16
14	Tohoku University	15
15	Università degli Studi Roma Tre	15
16	ELETTRA Sincrotrone Trieste S.C.p.A.	14
17	Freie Universität Berlin	12
18	Max Planck Institute for Solid State Research	11
19	Japan Science and Technology Agency	10
20	Istituto Nazionale per la Fisica della Materia	9

Prof. Sarma has collaborated with several Institutions both in India and Foreign countries in conducting research. While the total number of Research-Affiliates exceeds 150, Table 8 shows Top 20 Research-Affiliates based on the number of papers as obtained from Scopus. JNCASR, Bengaluru Stands First with 107 papers followed by Indian Association for the Cultivation of Science (85), Forschungszentrum Jülich FZJ (46), S N Bose National Centre for Basic Science (42) and CSIR with 41 papers respectively.

6.7 Keywords

The words used by author in article title conveys the main concept of the paper. These important words called 'keywords' are one of the best indicators to understand and to grasp instantaneously the thought content of the papers, methodologies used and areas of research addressed to (Angadi et al 2006). Table 10 shows list of keywords and frequency of usage in the article titles

Table 9 : Major Keyword frequencies from titles of publications

Keyword	Frequency	Keyword	Frequency
structure	91	spectroscopic	18
electronic	89	doped	17
transition	52	photoelectron	17
photoemission	48	investigation	16
spectroscopy	44	evidence	16
nanocrystals	39	studies	16
magnetic	38	temperature	15
properties	29	oxygen	15
metal	28	auger	15
perovskites	26	quantum	14
x-ray	27	semiconductor	13
effects	24	films	12
surface	23	magnetoresistance	12
oxides	23	doping	12

spectra	20	sr2femoo6	12
electron	19	compounds	12
metal-insulator	19	charge	10

As seen in Table 9, the keyword ‘Structure’ stands first and has appeared 91 times in the titles followed by electronic (89) and transition (52) respectively. These keywords indicate wide spectrum of interest, materials & methods used by the scientists.

6.8 Citations & H index

Table 10 : H index

Source	H Index
Scopus	70
Web of Science	70
Google Scholar	76

Table 10 shows H index as reported by different databases. While the score is same i.e 70 for both Scopus and Web of Science, Google scholar reports a higher score at 76.

According to Hisrich J E (2005), who proposed the h index, it is a quantitative metric based on analysis of publication data using publications and citations to provide “*an estimate of the importance, significance, and broad impact of a scientist’s cumulative research contributions*” The index is based on the set of the scientist's most cited papers and the number of citations that they have received in other people's publications.

- i. A value of an *h* index of 20 after 20 years of scientific activity, characterizes a successful scientist.
- ii. A value of an *h* index of 40 after 20 years of scientific activity, characterizes outstanding scientists, likely to be found only at the top universities or major research laboratories.
- iii. A value of an *h* index of 60 after 20 years, or 90 after 30 years, characterizes truly unique individuals.

Prof. Sarma has an h-index of 70. This value obtained after 42 years of scientific activity characterizes that he is a truly unique scientist in the field of chemical science

Table 11 : Top 10 Highly Cited papers

S.No	Year	Citations	Title	Source title	Vol No	Iss No

1	2000	436	Electronic structure of Sr ₂ FeMoO ₆	Physical Review Letters	85	12
2	1980	425	XPES studies of oxides of second- and third-row transition metals including rare earths	Journal of Electron Spectroscopy and Related Phenomena	20	1
3	2000	359	Size-selected zinc sulfide nanocrystallites: Synthesis, structure, and optical studies	Chemistry of Materials	12	4
4	2004	284	Evolution of the electronic structure with size in II-VI semiconductor nanocrystals	Physical Review B - Condensed Matter and Materials Physics	69	12
5	1995	269	Band theory for ground-state properties and excitation spectra of perovskite LaMO ₃ (M= Mn, Fe, Co, Ni)	Physical Review Letters	75	6
6	2004	266	Understanding the quantum size effects in ZnO nanocrystals	Journal of Materials Chemistry	14	4
7	1996	260	Electronic structure of early 3d-transition-metal oxides by analysis of the 2p core-level photoemission spectra	Physical Review B - Condensed Matter and Materials Physics	53	3
8	1992	251	Electron-spectroscopy study of the semiconductor-metal transition in La _{1-x} Sr _x CoO ₃	Physical Review B	46	16
9	2004	245	Synthesis and characterization of Mn-doped ZnO nanocrystals	Journal of Physical Chemistry B	108	20
10	2003	242	Structural and doping effects in the half-metallic double perovskite A ₂ CrWO ₆ (A=Sr, Ba, and Ca)	Physical Review B - Condensed Matter and	68	14

				Materials Physics		
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Table 11 shows the list of 10 articles ranked by number of citations received as obtained from Scopus database. While the number of citations keeps changing with time, the first article i.e Electronic structure of Sr₂FeMoO₆ in Physical Review Letters (2000) stands First with 436 citations and XPS studies of oxides of second- and third-row transition metals including rare earths published in Journal of Electron Spectroscopy and Related Phenomena in the year 1980 has 425 citations. All the top 10 papers have 200+ citations.

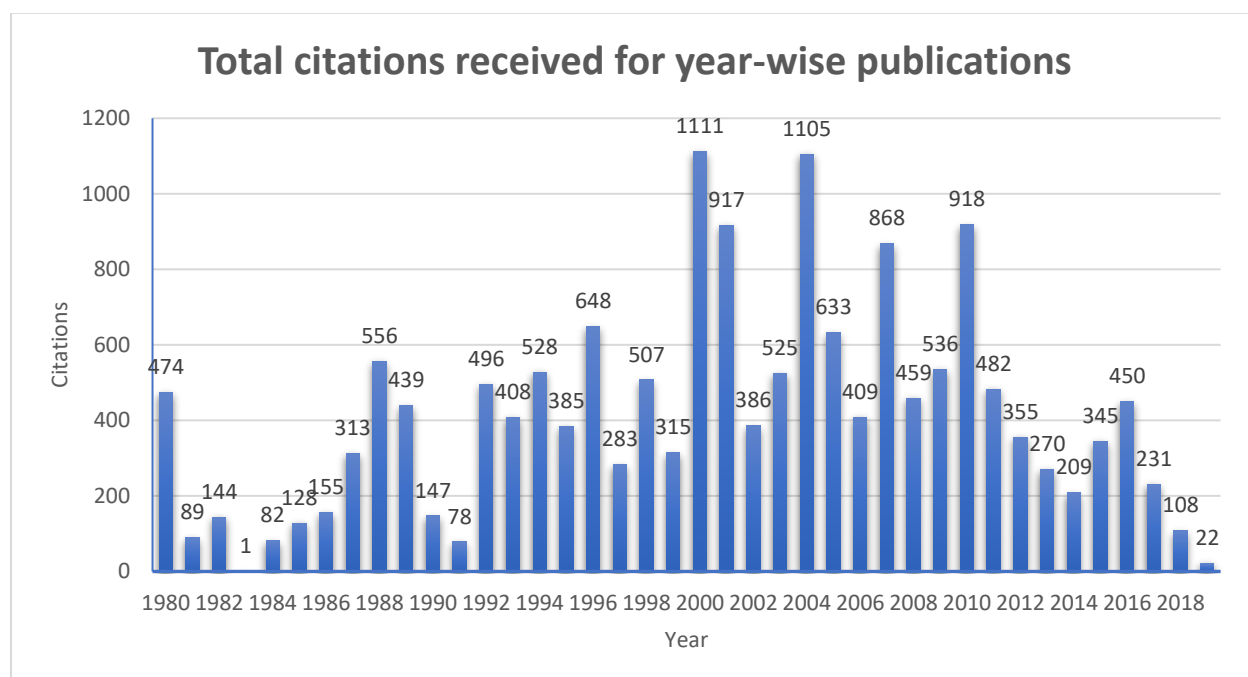


Figure 4 : Total citations received for year-wise publications so far (Scopus)

Table 1 and Figure 4 shows total citations received for year-wise publications (up to September 2020) for articles authored by Prof. D.D. Sarma as reported by Scopus database. While the number citations keep changing over the time, the highest number of citations received i.e 1111 was during the year 2000 followed by 1105 during the year 2004 and 918 citations during the year 2010 respectively.

7. Conclusion

Prof. D.D. Sarma has 482 + publications and 10 patents to his credit. He has a h-index of 70 (Scopus & WoS) which is high score and characterizes that he is outstanding scientist in the field of chemical science. He has published in 110+ high impact journals. He has collaborated with more than 150 authors and Degree of collaboration is 0.98 (i.e 98%) shows extensive collaboration with other scientists. His articles have been cited by more than 16,500 papers as per Scopus and 21,000+ citations as per Google Scholar showing

high impact of research work. In the four decades of scientific activity, he has received several prestigious awards like Shanti Swarup Bhatnagar Award in Chemistry (1994), G.D. Birla Award for Scientific Research, (2005) etc. He has guided 33+ students in their Doctorate studies among which about 44% have received best Thesis award. He continues to guide another 10+ students and is a role model for younger generation to follow.

8. Acknowledgments

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Appendix – Brief Profile of Prof. D D Sarma

Prof. Sarma has held several Academic Positions in National & International Institutes as Adjunct & Honorary Professor including TIFR Mumbai, JNCASR Bengaluru etc.

Important Awards and Recognitions - National

- The first holder of J.N. Tata Chair of Indian Institute of Science (2017-2020)
- H K Firodia Award for Excellence in Science & Technology, 2013
- National Research Award in Nano Science and Technology, 2009
- FICCI Award 2006-07 for Innovative R&D in Life Sciences/Material Sciences/Applied Research/Space Sciences, 2008
- UGC National Hari Om Ashram Trust Award: Sir C.V. Raman Award for Physical Sciences, 2004. Awarded in July 2006
- G.D. Birla Award for Scientific Research, 2005
- Shanti Swarup Bhatnagar Award in Chemistry, 1994
- Sir J.C. Ghosh Medal, 1981, for the best thesis

Important Awards and Recognitions - International

- The Bernard Coqblin Prize, Japan, 2019
- Knight of the Order of the Star of Italy by the Republic of Italy, 2014
- The World Academy of Sciences (TWAS) Physics Prize 2006
- UNESCO biennial Javed Husain Prize, 1989.

He has completed projects worth crores of rupees as Principal Investigator. Prominent include

- Utilization of Indo-Italian beamlines at Elettra Sincrotrone, Trieste, Italy - funded by DST (Rs. 20,77,00,000.00, 2017-2022) to provide access to the two beamlines at Elettra for the use by national users.
- Access to the beamlines of the Elettra Synchrotron Light Laboratory by all Indian institutions - Funded by DST under the Indo-Italian POC. (Rs. 12,200,000 during 2010-2015).