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2011

## Preface

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Kim, Yong-Rak and Bhasin, Amit, "Preface" (2011). *Mechanical & Materials Engineering Faculty Publications*. 141.  
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Published in *International Journal of Pavement Engineering* 12:4 (August, 2011), p. 289;  
doi: 10.1080/10298436.2011.600811.  
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## Preface

Over the last couple of decades there has been a significant shift from the use of empirical approaches toward the use of mechanics and materials science to characterize the performance of bituminous materials. The macroscopic performance of the asphalt composite depends on the fundamental physical, chemical, thermal, and mechanical properties of the constituent materials and the interaction between these materials at different length scales (nano, micro, meso, and macro).

A high level of complexity is introduced to characterize and model bituminous materials due to significant heterogeneity at different length scales and various forms of distress that are typically coupled with processes such as moisture diffusion, temperature variation, aging of asphalt binder, and self-healing of asphalt binder. Given the complex nature of the problem and the multiple scales at which it can be addressed, it is reasonable to expect that an individual researcher can at best focus on few aspects of the problem.

This special issue brings together individual pieces of knowledge pertaining to the various areas of research on bituminous materials into a coherent, state-of-the-art document. Our attempt was to compile papers related to the characterization of material properties, damage mechanisms, and structural performance of bituminous materials at the multiple length scales.

Our hope is that this special issue will serve as a reference document to provide researchers and graduate students with an overview of the background and ongoing research on different aspects pertaining to bituminous materials. Finally, we would like to acknowledge that this special issue is not all-encompassing. While there are several leading researchers in this area who may not have contributed directly to this issue, their work is clearly reflected in the included papers.

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