Abstract Submitted
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**Optical Characterization of Temperature-Dependent Microstructure of Polymeric Asphalt Binders** ADAM RAMM, FARBOD SHAFIEI, Physics Dept., Univ of Texas, Austin, MARYAM ZAMANI, Physics Dept., Shahid Beheshti University, Iran, SHARMIN SULTANA, AMIT BHASIN, Civil Eng. Dept, Univ of Texas, Austin, M. C. DOWNER, Physics Dept., Univ of Texas, Austin — Asphalt binders used in construction of pavements must be chemically engineered to withstand wide climatic variations. Ideal binders possess high stiffness at high temperatures, low stiffness with high relaxation rates at low temperatures, and high resistance to fatigue cracking at intermediate temperatures. Such bulk properties are conventionally measured with rheometers, but appear to be closely connected with temperature-dependent microstructural changes. AFM has been used to observe such microstructures, but is only possible near room temperature [1]. Here we characterize asphalt binder microstructure over a wide range of temperatures and chemical compositions using noninvasive optical microscopy correlated with linear and second-harmonic optical scatter to measure statistical fluctuations. For example, micron-size "bee"-structures previously observed by AFM [1] are resolved optically, and are observed to vary as temperature and composition change, while inducing corresponding changes in optical scatter. We will present these and other optical measurements, and discuss their connection to bulk material properties. [1] Pauli et al., Internat. J. Pavement Engin. 12, 291 (2011).

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