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Surface scattering from ceramic phosphors ALAN LENEF, JOHN KELSO, CHRISTOPHER PETERS, OSRAM SYLVANIA Inc — Scattering from phosphor converters and epitaxial surfaces is critical for solid state lighting device performance. Volume and surface scattering in solid state lighting devices can play a critical role in efficiency/efficacy, color points, and color angular consistency. Surface scattering in particular has not been well characterized in solid state lighting devices and can be complex to model. Because large angle scattering is important in lighting applications, surface scattering models generally require vector electromagnetic theory to avoid ambiguities often associated with scalar theory at these angles. Furthermore, surface features are often on the order of a few wavelengths, bringing ray tracing approaches into question. In this work, experimental angular scattering measurements are made on ceramic phosphor components where surface scattering dominates. The surface ceramic grain structure is responsible for the scattering. The results are compared to approximate statistical vector theory predictions that use the height autocorrelation functions as input. The autocorrelation measurements were derived from atomic-force microscopy topography measurements. Resulting predictions are in fairly good agreement with measurements.

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