Abstract Submitted
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High-Temperature Surface Thermometry Technique based on Upconversion Nano-Phosphors[1] C. COMBS, N. CLEMENS, U. of Texas at Austin, X. GUO, H. SONG, H. ZHAO, K.K. LI, Y.K. ZOU, H. JIANG, Boston Applied Technologies Inc. — Downconversion thermographic phosphors have been extensively used for high-temperature surface thermometry applications (e.g., aerothermodynamics, turbine blades) where temperature-sensitive paint is not viable. In *downconversion* techniques the phosphorescence is at longer wavelengths than the excitation source. We are developing a new *upconversion* thermographic phosphor technique that employs rare-earth-doped ceramics whose phosphorescence exhibit a strong temperature dependence. In the upconversion technique the phosphor is excited with near-IR light and emission is at visible wavelengths; thus, it does not require expensive UV windows and does not suffer from interference from background fluorescence. In this work the upconversion phosphors have been characterized in terms of their intensity, lifetimes and spectral content over a temperature range of 300K to 1500K. The technique has been evaluated for applications of 2D surface temperature measurements by using the total integrated intensity and the ratio of emission in different visible color bands. The results indicate that upconversion phosphor thermometry is a promising technique for making non-contact high-surface temperature measurements with good accuracy.

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