

Influence of Fluid and Seeding Properties on Phosphor Thermometry in Liquid Flows

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In this pilot study, we investigated potential thermographic phosphors for temperature field measurements in liquid flows. Three different phosphor materials were studied, namely BAM:Eu, YAG:Dy,Er and ZnO. The main focus was the identification of influencing factors like seeding concentration and fluid properties on the luminescence behavior for phosphor thermometry in liquids. First, their spectrally resolved lifetime characteristics were studied at room temperature in air using a streak system. Then, their luminescence properties were studied in different liquids (like oil and water). The particle concentration and different liquid solutions were particularly evaluated.

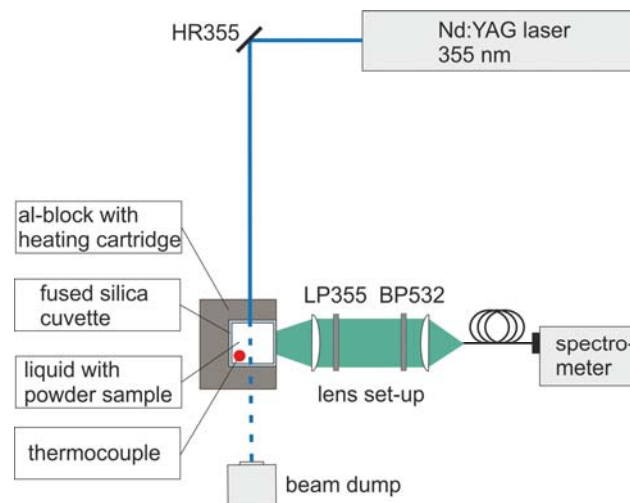


Fig. 1. Experimental set-up for phosphor thermometry in liquid flows

The phosphor particles were added to the liquid and distributed with an ultrasonic disperser. Following laser excitation, the luminescence emission at room temperature of the phosphor particles were recorded with a spectrometer for different liquids and particle concentrations. For the temperature range of interest (up to about 320 °C), ZnO and BAM:Eu are most promising, and their temperature dependent luminescence emission was investigated in water and oil.