Topic number: 7.

PARTICLE PROPERTY EVALUATION BY MEANS OF LIGHT SCATTERING

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In this paper, white light scattering from the particles grown or injected in the plasma was used for evaluating the particles properties. The experiments were done in the PK-3 setup [**?**] (parallel plate rf plasma). Particles were illuminated by the collimated beam of white light while scattered light were collected from the column created by the collimator from the fixed angle (about 20 degree). With this geometry the scattered light was collected from the small volume as intersection of these two columns.

Two types of experiments were done. In the first experiment, particle were grown in the discharge on the long time scale (about 40 minutes) and the scattered spectrums were recorded. Scattered light from the particles was measurable far before the particles could be visible by eye or camera. The recorded scattered spectrums normalized by the illumination light in different times are shown in figure **??**(left).

In the second experiment two different mono-dispersed particle types were used (5.26 μm melamine formaldehyde and 7.5 μm polystyrene). Characteristic scattered spectra of each of the particles were recorded separately from the known particle density. After the injection of both particle types in the plasma scattered spectrum shows mixed property. It was shown that the scattered spectra from the mixture can be represented as the linear combination of the spectrums of the individual particle types with nice accuracy. This way composition of the mixture can be evaluated. The characteristic spectrums of individual particle types, mixtures and linear combination are presented in figure **??**(right).

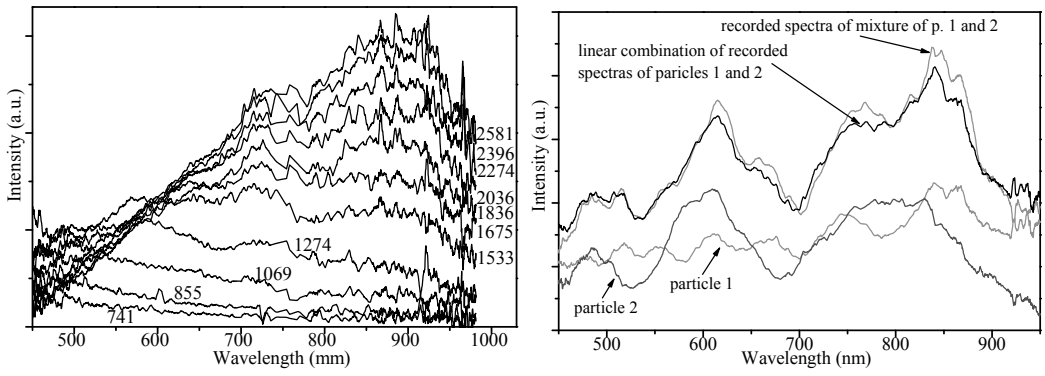

Fig. 1: The scattered spectra from the grown particles in the discharge in different times (in seconds), normalized by the illumination spectrum are presented in figure left. Characteristic scattered spectrums from two different particle types are presented in figure right. Scattered spectrum from the mixture and linear combination of two characteristic spectra shows very nice agreement.

Experiments shows that observation of the scattered light (300 nm - 1000 nm) from the particles in plasma can be very useful non-intrusive method for complex plasmas diagnostics. Using this simple method grown particles could be detected in the plasma far before using camera or naked eye. Also, particles mixture in the plasma can be resolved. System is non-intrusive, local (good spatial and time resolution can be achieved), non destructive for most of the experiments.

Reference

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