Laser induced fluorescence spectroscopy in a nanoparticle forming plasma

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The presence of huge quantities of nanoparticles strongly modifies plasma properties [1, 2]. Collecting free electrons from the discharge [3], an increase of the electron temperature is provoked [4] and, thus, the entire chemistry is changed. Not seldom even plasma instabilities are created, some of them on time scales visible to the human eye [5, 6]. Because instabilities are a tempo-spatial phenomenon, adequate techniques have to be applied in order to understand their nature.

In this study laser induced fluorescence [7] and absorption [8] spectroscopy were used to monitor the evolution of argon metastable atoms during the growth of dense nanoparticle clouds from sputtering melamine-formaldehyde in a sealed RF plasma chamber. The spectroscopic data are correlated with the pressure evolution and discharge current [9] to comprehend the impact of localized effects, like void formation, on the entire process.

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