The Role of Soot Inception Conditions in their Structures

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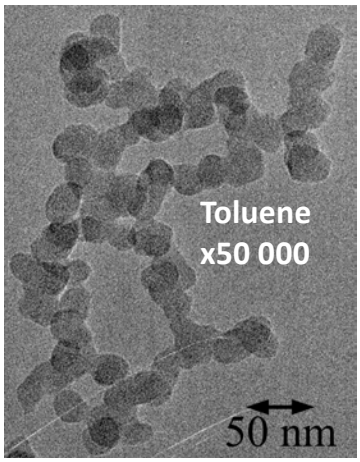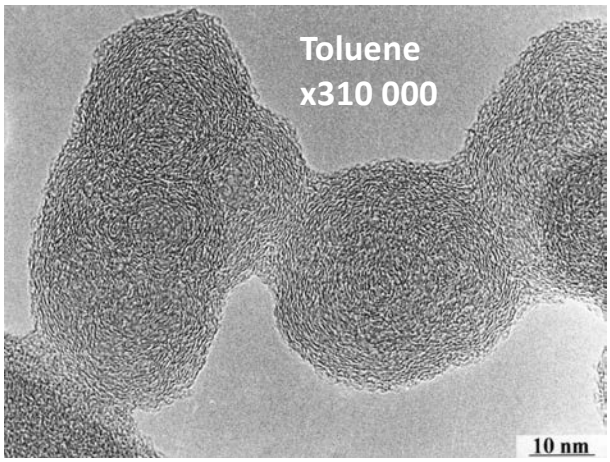
Particulate emission from diesel engines has been of great concern from both pollution and public health. Their regulation has led to the development of post-processing such as particulate filters that are now mandatory for diesel engines. Moreover, this issue is also raised for gasoline engines as well as gas turbines. If, to some extent, we have a better understanding of the soot formation and the models have improved, their oxidation remains a challenge that needs to be addressed. Indeed, the oxidation of the soot will depend strongly on two main factors: (i) the size of the soot and (ii) the species adsorbed on the soot surface. It is then very important to understand the type of soot being formed according to the initial conditions (fuel type, temperature, pressure). In this presentation, an overview of our work on the role of the inception conditions in the soot properties will be given based on experiments performed using a shock tube coupled to different diagnostics: extinction and scattering measurements (in-situ measurements), laser desorption coupled to a time-of-flight mass spectrometer and TEM analysis, at high and low resolutions, (ex-situ measurements). The effect of the nature of the fuel and the temperature at which the soot are being formed on the soot organization will be assessed.