

Adsorption of polycyclic aromatic hydrocarbons on soot: Production of benchmark particles

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Polycyclic aromatic hydrocarbons (PAH) are key components in the formation of soot particles during combustion processes [1]. Moreover, some PAH are an issue in environment pollution and health [2]. Despite these societal problems, the adsorption of PAH molecules on soot particles is almost unknown due to the lack of diagnosis allowing to characterise the adsorption during the growing process in flames. The lack of benchmark soot-PAH aggregate with known PAH content mostly explained the absence of efficient calibrated diagnosis. The CAHAPS project (a French acronym for online characterisation of PAH molecules on soot particles) aims to fill this lack of diagnosis.

The first step is to produce a set of benchmark soot-PAH particles with a well-controlled soot particle and PAH molecules. The production of benchmark particles is done coupling a soot generator to a gas aggregation cluster source. To characterise the particles formed, we will perform time-of-flight mass spectrometry of the particle beam.

Dealing with the adsorption of PAH on soot, we aim to look for the dependence with the PAH type for a given kind of soot particles. We will produce controlled aggregates with soot particles selected with respect to their size and morphology and a well-defined vapour of PAH molecules. The soot particles produced by a generator will be characterised in function of their size and morphology. A given species will be selected and it will be injected into the gas aggregation source where a vapour of PAH molecules is produced by an heated oven. On the one hand, we aim to look for the influence of the PAH structure comparing the adsorption yield of PAH isomers. On the second hand, we will study the adsorption in function of the PAH size.

The authors acknowledge the financial support of the French Agence Nationale de la Recherche (ANR), through the program "Investissements d'Avenir" (ANR-10-LABX-09-01), LabEx EMC³.

References:

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