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New insights into the anion formation mechanisms in dusty acetylene discharges MING MAO, PLASMANT Research Group, Dept. of Chemistry, Univ. of Antwerp, JAN BENEDIKT, ANGELO CONSOLI, Arbeitsgruppe Reaktive Plasmen, Fakultät für Physik und Astronomie, Ruhr-Universität Bochum, ANNEMIE BOGAERTS, PLASMANT Research Group, Dept. of Chemistry, Univ. of Antwerp — Dust (or nanoparticle) formation is a well-known phenomenon occurring in reactive gas plasmas, such as silane or acetylene. Under some conditions, the dust formation is considered to be harmful, whereas for other applications, it turns out to be beneficial. In this presentation, the initial mechanisms of nanoparticle formation and growth in radiofrequency (RF) acetylene (C2H2) plasmas are investigated by means of a comprehensive self-consistent one-dimensional (1D) fluid model. Based on the comparison of our calculation results with available experimental data for acetylene plasmas in the literature, some new mechanisms for negative ion formation and growth are proposed. Possible routes are considered for the formation of larger (linear and branched) hydrocarbons $C_{2n}H_2$ (n=3-5), which contribute to the generation of $C_{2n}H^-$anions (n=3-5) due to dissociative electron attachment. Moreover, beside the $C_{2n}H^-$ ions, also the vinylidene anion (H_2CC^-) and higher $C_{2n}H_2^-$ anions (n=2-4) are found to be important plasma species. This project was supported financially by the Fund for Scientific Research (FWO) Flanders (Project G. 0068.07), the Interuniversity Attraction Poles Programme of the Belgian State (Belgian Science Policy; Project P6/42) and the CALCUA computing facilities of the University of Antwerp.

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