Flexoelectricity and the electrical aspects of carbon formation in flames

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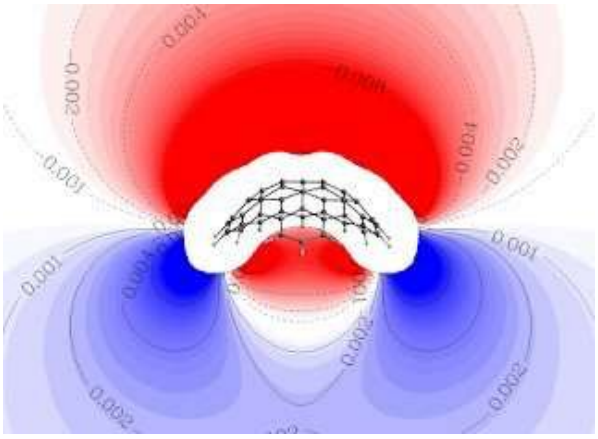
Electric fields are well known to influence soot formation. We suggest that curved aromatics, electrically polarised via the flexoelectric effect, provide a potential explanation for the modification of the soot particle number and size [1]. Early soot nanoparticles were sampled within a diffusion flame and were imaged using high resolution transmission electron microscopy. Fringes indicating 1-3 pentagonal rings and aromatic planes 1 nm in diameter were observed. Previous electronic structure calculations performed on a range of these curved molecules suggested a significant dipole moment of 4-6 Debye is present [2]. Generation of chem-ions and their interaction with curved aromatics are suggested to explain the increase in particle number in electric field modified flames.



References:

1. J.W. Martin et al., *J. Phys. Chem. C*, **2017**, 121, 27154-27163
2. J.W. Martin et al., *J. Phys. Chem. C*, **2018**, 122, 22210-22215