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Spectroscopy and microscopy of coronene-carbon nanotube hybrid structures[1] KATALIN KAMARAS, BEATA NAGY, HAJNALKA TOHATI, Wigner Research Centre for Physics, Budapest, Hungary, BEA BOTKA, RUDI HACKL, Walther Meissner Institute, Garching, Germany, THOMAS CHAMBERLAIN, ANDREI KHLOBYSTOV, University of Nottingham, United Kingdom —
The flat, disc-shaped polyaromatic hydrocarbon coronene and its derivatives can form various hybrid structures with carbon nanotubes: its size makes encapsulation possible inside the most abundant carbon nanotubes, and its conjugated π-electron structure enables $\pi - \pi$ bonding on the surface of the nanotubes. Depending on synthesis conditions, adsorption, encapsulation and polymerization reactions are all possible, resulting in coronene-based polymers, graphene nanoribbons or double-walled carbon nanotubes. Synthesis and characterization of such hybrid structures will be reported. Synthesis variations included sublimation temperature and exchanging the hydrogen atoms on the perimeter of the molecule for other atoms. Characterization was performed by transmission electron microscopy, as well as infrared, Raman and photoluminescence spectroscopy. We will present how synthesis conditions affect the reaction of the molecular species to form polymers or nanoribbons. We find that the nanotube surface catalyses the polymerization of coronene, and that non-carbon atoms other than hydrogen on the perimeter facilitate nanoribbon formation.

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