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Microwave plasma produced carbon nanostructures JULIO HENRIQUES, ELENA TATAROVA, Institute of Plasmas and Nuclear Fusion, Instituto Superior Tecnico, Technical University of Lisbon, Portugal, CLAUDIA LUHRS, JONATHAN PHILLIPS, Department of Mechanical and Aerospace Engineering, Naval Postgraduate School,Monterey, CA 93943, USA, ANA REGO, ANA FERRARIA, Centro de Quimica-Fisica Molecular and IN, Instituto Superior Tecnico, Technical University of Lisbon, Portugal, MIROSLAV ABRASHEV, Faculty of Physics, Sofia University, Sofia, Bulgaria, ANA DIAS, CARLOS FERREIRA, Institute of Plasmas and Nuclear Fusion, Instituto Superior Tecnico, Technical University of Lisbon, Portugal — A microwave, atmospheric argon plasma driven by surface waves has been used for synthesizing carbon nanostructures by passing vaporized ethanol through the plasma. The method is based on sending vaporized ethanol molecules through a microwave argon plasma environment, where decomposition of ethanol molecules takes place and carbon atoms are created. These carbon atoms agglomerate subsequently in the outlet gas stream to form nanostructures that are collected by nylon membrane filters. External, forced cooling/heating has been applied using a cryostatic system to fix the temperature in the nucleation zone of the plasma reactor. The synthesized carbon nanostructures were analyzed by high-resolution transmission electron microscopy (HRTEM), X-ray photoelectron spectroscopy (XPS), and micro-Raman spectroscopy. Graphene sheets and carbon nanoparticles have been selectively synthesized through the control of the outlet plasma stream temperature.

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