

Carbon Nanoballoon Produced by Thermal Treatment of Arc Soot

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A novel form of balloonlike carbon material (carbon nanoballoon abbreviated CNB), with a diameter of 40 ± 15 nm and a shell thickness of 10 nm, was found after thermal treatment of arc soot at more than 2400°C. The arc soot was prepared by arc discharge between a pair of pure graphite rods under nitrogen (N₂) atmosphere. The characterization of the CNB by field-emission scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM) and Raman spectroscopy shows that the CNB is highly graphitized carbon, and the CNB exists in forms of individual deformed balls and ball aggregates. The thermal growth of the CNB from the arc soot was followed by TEM observation. The methods for the introduction of pinholes and for the thickness control of the balloon shells were also investigated for the further application of this nanoballoon-like material.