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Title:Localization and electrical transport in onion-like carbon based composites

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Abstract:Electrical transport properties of onion-like carbon (OLC) based composites over a wide (20 Hz-4 THz) frequency range are reported. The dependencies of dc conductivity on temperature can be approximated by the Mott law for one-dimensional variable range hopping below 130K and by the typical law for fluctuation induced tunneling within the range of 130-300K. The critical frequency at low temperatures also decreases according to the Mott law for one-dimensional variable range hopping. It was demonstrated that OLC annealing temperature plays a high role on the dielectric and electrical properties of composites at low temperatures. In the terahertz frequency range, the main contribution to the complex electrical conductivity is due to the phonon contribution while the contribution from hopping conduction vanishes at these frequencies. (C) 2012 American Institute of Physics. [http://dx.doi.org/10.1063/1.4714555]

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