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Magnetic properties of graphite nanostructures in carbon microspheres[1] EDUARD SHAROYAN, ARAM MANUKYAN, ARMEN MIRZAKHANYAN, Institute for Physical Research, Ashtarak, Armenia, CARLOS SANCHEZ, ARMEN KOCHARIAN, OSCAR BERNAL, California State University, Los Angeles — Carbon microspheres with interesting magnetic properties are prepared by solid-phase pyrolysis using as a precursor the metal-free phthalocyanine $H_2(C_{32}N_8H_{16})$. By changing conditions of pyrolysis an average diameter d=2-3.8μm carbon microspheres, consisting of graphitized nanocrystallites with a thickness of 5-15 graphene layers of 5-20nm width with sufficiently narrow size distribution are formed. In particular, at T_{pyr}=700^{0}C and t_{pyr}=60min carbon microspheres have average d=3.4$\pm$0.15μm. Magnetic characteristics of samples are investigated by vibrational magnetometer in temperature range T=5-300μm and magnetic fields up to H=80kOe, as well as with the ESR method. Analysis of magnetization M vs H and T show presence of paramagnetic centers with concentration n=3$\times$10^{19}spin/g and temperature-independent diamagnetism with susceptibility, κ_{dia}=1.5$\times$10^{-6} emu/g Oe. Parameters of ESR spectrum are: g-factor 2.0031, intensity $\sim$5$\times$10^{19}spin/g and narrow linewidth of 0.8Oe due to strong exchange. Paramagnetism in carbon microspheres is apparently driven by edge uncompensated spins of nanographitic crystallites and impurity nitrogen atoms.

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