Ferromagnetic nanoparticles in inorganic matrix processed by polymerisation of metal containing monomers

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Unique properties of nanomaterials, resulting from nanosized components, have recently been a subject of intensive studies. In this work inorganic matrix ferromagnetic nanocomposites, containing Co nanocrystallites, were processed by an innovative fabrication method using frontal polymerisation of cobalt acrylamid complex (CoAAm). The microstructure, depending on the pyrolysis temperature, consists of Co nanocrystallites having the mean size 7.2 nm and 21.3 nm, for the material pyrolysed at 873 K and 1073 K, respectively (Fig. 1).

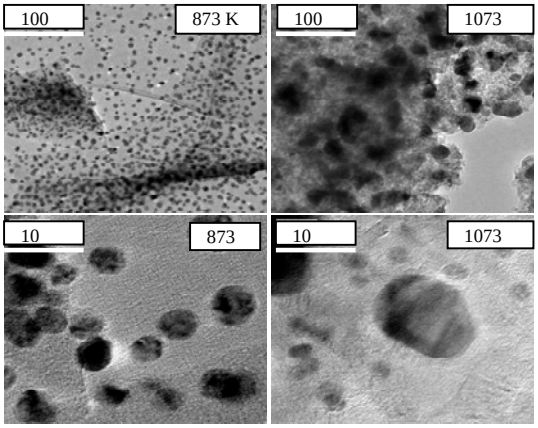

Fig. 1. HRTEM micrographs of the naocomposite material after pyrolysis at 873 and 1073 K, respectively.

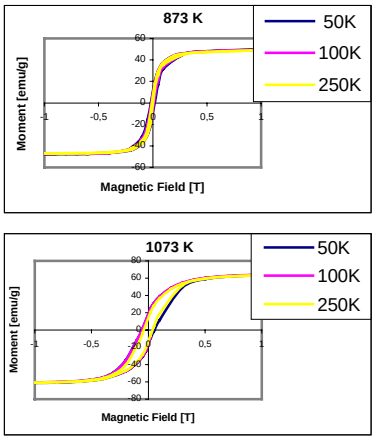

Fig. 2. Hysteresis loops of the naocomposite material after pyrolysis at 873 and 1073 K, respectively, recorded at 50, 100 and 250 K.

The hysteresis loops recorded for materials processed at 873 and 1073 K, respectively proved that the coercivity depends on the processing temperature and very slightly on the measurement temperature (Fig. 2). The loops taken at temperatures 50, 100 and 250 K almost overlap. According to the commonly approved classification the coercivity of the composite material processed at temperatures 873 and 1073 K can be regarded as magnetically soft and hard, respectively.

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