Non-hydrolytic synthesis of synthetic MFe_2O_4 (M – Mn^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+}) ferrite spinel and their incorporation into the polymeric matrix

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The series of the highly crystalline MFe_2O_4 ferrite spinel nanoparticles were synthesized via modified Bradley reaction using microwave stimulation. Particle size of 10 to 20 nm was estimated using Scherrer and Rietveld methods as well as TEM and dynamic light scattering (DLS). Hydrodynamic size was measured using DLS technique on non-modified, surfactant free particles of the whole MFe_2O_4 series. Strong asymmetric behavior of the A_{1g} mode was found and deconvoluted revealing additional components. Among all of the products the lowest site inversion was found for the manganese ferrite $MnFe_2O_4$. Typical magnetic behaviour of the MFe_2O_4 family was studied in detail.

The resulting stock particles were incorporated into the polymer PMMA matrix forming bulk and powdered composite organic-inorganic systems.