Abstract Submitted
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Preparation and Characterization of a Superparamagnetic Polymer Nanocomposite N. BRENNER, R. ISSEROFF, Lawrence High School, Cedarhurst, NY, M. RAFAILOVICH, G. RUDOMEN, R. GAMBINO, S.S. LIANG, D. SUNIL, M. SI, L. COLLAZO, N. PERNODET, X. FANG — $Fe(CO)_5$ decomposition produced ferro- and superparamagnetic polymer nanocomposites. $Fe(CO)_5$ and Cloisite 20A clay were combined in a closed vial for 12 hours, then opened to air for 2 hours. Mössbauer analysis indicated formation of Fe_2O_3 on clay; mass analysis indicated 12% Fe in clay. A Brabender mixed Fe_2O_3/clays with PMMA and EVA at ratios by mass of 9:4:36 and 1:1:4 respectively ($Fe(CO)_5$:clay:polymer). TEM displayed Fe_2O_3 nanoparticles, 3.3 ± 0.8 nm in diameter, adsorbed on exfoliated clay platelet surfaces in polymer matrices. VSM data indicated superparamagnetism with moments of 510.3 emu/$g_{(Fe2O3)}$ (PMMA) and 8.46 emu/$g_{(Fe2O3)}$ (EVA). DMA showed 37% decreased dynamic modulus (EVA) and 11% (PMMA) due to Fe_2O_3. TGA indicated PMMA stability to 400^oC (9.3% mass residual) and EVA to 435^oC (11% mass residual). Cell adhesion tests showed Fe_2O_3/clay enhanced proliferation, promising applications in bone implants.

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