Contribution ID: **78** Type: **Poster**

Incorporation and localization of magnetic nanoparticles in printed hybrid thin nanoparticle-diblock copolymer films investigated by GISAXS

Tuesday 5 December 2023 14:00 (3 hours)

Ordered magnetic hybrid thin films composed of a diblock copolymer (DBC) and magnetic nanoparticles (MNPs) are interesting due to the mixing of properties from the organic and inorganic precursors. The unique attributes of these hybrid films make them attractive for use in applications ranging from magnetic sensors to magnetic data storage devices. In this study, thin DBC films of polystyrene-block-poly(methyl methacrylate) (PS-b-PMMA) are investigated as scaffolds for the MNPs nickel oxide (NiO) and cobalt ferrite (CoFe2O4). The thin films are printed using a slot-die coating technique and the evolution of the final film morphology is tracked in situ by grazing incidence small-angle X-ray scattering (GISAXS). Analysis of the GISAXS experiments, complemented by the real-spacing imaging method atomic force microscopy (AFM), reveals the selective incorporation of the CoFe2O4 MNPs into the PS domains while the further addition of NiO MNPs does not disturbed the DBC nanostructure. The temperature dependent magnetic properties of the thin hybrid films are investigated with a SQUID magnetometer. Films containing only CoFe2O4 show expected behavior as the coercivity and remanence increase with decreasing temperature. Upon addition of NiO, the mixed hybrid thin films show a unique pinched hysteresis curve resulting in an increase in coercivity and squareness when compared to the single MNP films.

Authors: EVERETTT, Christopher (TU München, Physik-Department, LS Funktionelle Materialien); MÜLLER-BUSCHBAUM, Peter (TU München, Physik-Department, LS Funktionelle Materialien)

Co-authors: Dr LAK, Aidin (TU Braunschweig); KOSBAHN, David (TUM E13); HARTMANN, Frank (Universität des Saarlandes); PAN, Guangjiu (Technische Universität München, Fakultät für Physik, Lehrstuhl für Funktionelle Materialien); REUS, Manuel (TUM E13); Prof. GALLEI, Markus (Universität des Saarlandes); BITSCH, Martin (Universität des Saarlandes); OPEL, Matthias (Bayerische Akademie der Wissenschaften); Dr SCHWARTZKOPF, Matthias (DESY)

Presenter: EVERETTT, Christopher (TU München, Physik-Department, LS Funktionelle Materialien)

Session Classification: Poster Session

Track Classification: Material Science