with others indicating larger spacing. Samples reach in PCL (% ≥ 80) exhibit also smaller spacings. Examination of SAXS curve for clay intercalated PHB suggests the existence of thin platelets, constituted by single layers or a stacking of few layers. No evidence of similar behavior has been observed in NC prepared with other polymers proportions, in spite of the observed improvement of their characteristics.


Keywords: Biodegradable polymers, Polymers Clay Nanocomposites

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MEM electron density study of NaGaH₄
Niels Bindzus, Helle Svendsen, Mogens Christensen, Torben R. Jensen, Bo B. Iversen, Department of Chemistry, Aarhus University, DK – 8000 Aarhus C., Denmark. E-mail: nielsb@chem.au.dk

The search for hydrogen storage materials has received massive attention during the past decade in hope that hydrogen, in the future, may replace fossil fuels as energy carrier. Among the considered compounds, it is worth mentioning NaGaH₄ that is formed of almost isolated GaH₄ anions and spherical Na⁺ moieties. It has about 4.2 wt% hydrogen, therefore not fulfilling the requirements for being a candidate hydrogen storage material for mobile applications. However, the compound reveals peculiar structural features that deserve further examination. In particular, a phase transition around 200 K has been pointed out by an anomaly in heat capacity measurements. [1] XRPD analysis likewise revealed a discontinuity in atomic displacement parameters when going from low to high temperatures. [2] V. P. Tarasov et al., on the basis of NMR data, implied that the phase transition can be attributed to changes in the orientation state of the distorted Ga(H, D)₄ anion. [3] Despite all the hints of a phase transition, structural knowledge is still lacking.

We studied NaGaH₄ in the temperature range 90 K – 390 K by synchrotron X-ray powder diffraction data collected at SPring-8, Japan. Complementary synchrotron neutron powder data were collected at PSI, Switzerland, on the deuterated sample, NaGaD₄. For each of the considered temperatures, the Maximum Entropy Method (MEM) is utilised to maximise the information contained in the extracted structure factors and to determine the corresponding electron density. The MEM charge density at 90 K (fig. 1) is analysed within the quantum theory of atoms in molecules, [4], and compared to theoretical charge density obtained from periodic ab initio DFT calculations.

Rietveld refinements and MEM densities of NaGaH₄ and NaGaD₄ do not show any apparent, structural indication of the expected phase transition. A possible explanation is provided by Raman scattering studies which imply a symmetry reduction with increasing temperature. [5] This is supported by structural NMR results which up to the considered temperatures, the Maximum Entropy Method (MEM) is critically evaluated. Clearly such evaluation needs to keep in mind that applicability of standard powder diffraction methods on nanocrystalline materials is controversially debated [3].

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Keywords: nanocrystal, yttrium oxide

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Preparation and structural characterization of HFMOD-WO₃ thin films

Tungsten oxide films have been successfully deposited by hot-filament metal oxide deposition (HFMOD) technique under atmospheric pressure and an oxygen atmosphere. Although several techniques were used to characterize the WO₃ layers, this work emphasizes the results...