Poster Presentation

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Complementary XRD and XAFS Studies of Double Metal Cyanides catalysts

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Highly disordered materials exhibit diversity of the functional properties which are of interest of nowadays technology. The example of such materials is the group of a non-stoichiometric composite transition metal complex salts, known as double metal cyanides (DMC). These materials are used as the industrial catalysts and form an interesting family of porous molecular materials with large fraction of the amorphous phase. This fraction may be obtained by introduction to the crystalline zinc hexacyanocobaltate (III) (Zn3[Co(CN)6]2•nH2O) organic ligands of different size. Depending on the type of ligands the catalysts exhibit different levels of activity. The crystalline zinc hexacyanocobaltate exhibits only very weak catalytic properties. The others have a considerably high activity, which is their key feature. Although the said group of catalysts is successfully used and progressively developed for decades, the knowledge on the molecular nature of their particularly high activity and selectivity is modest and limited to some phenomenological hypotheses based on overall chemical premises. The attempt to formulate important for DMC catalysts relationship between the concentration of amorphous phase and their activity as well the influence of an organic ligand presence on formation of amorphous phase, suspected to be responsible for catalytic properties, will be presented. The base for this is the reliable characterization of such materials which requires application of several methods providing complementary information. The application of x-ray diffraction and absorption will be discussed and the benefit of each method will be described. Acknowledgments: Research funded in part by the Projects BSR, Science Link and Innotech K2/IN2/21/181982/NCBR/ 12(K-DMC). Financial support from the EU FP7 under the grant agreement REGPOT-CT-2013-316014 is gratefully acknowledged. Jaroslaw Janik is a Fellow of the project "PhD Scholarships - an investment in faculty Opole province" co-financed by the European Union under the European Social Fund.

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