BOOK OF ABSTRACTS

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Mesoporous Silica based copper catalytic materials: Synthesis, Characterization & deNOx Evaluation

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Over the last years, mesoporous silicas have gathered considerable interest especially in the field of de-NOx catalysis [1,2,3]. Amongst other, polyol process is considered a promising technique since a liquid polyol act as both solvent and reducing agent. In the present study, the development of catalytic systems was performed through a modified polyol route utilizing two mesoporous siliceous templates (MCM-41 & MCF-LA) as substrates and copper as the active component. The main objective was to investigate the effect of different textural characteristics on the development of MNPs and de-NOx catalytic activity. During the synthesis, microwave irradiation was applied as the heating source, whereas the size and dispersion of as-formed NPs on the porous hosts was effectively controlled through appropriate fine tuning of the different reaction parameters. Characterization results reveal the successful development of Cu NPs of 15 nm in size in all studied samples. Preliminary deNOx catalytic activity results under stoichiometric conditions demonstrate an enhanced performance reaching 35-40% maximum NO conversion by CO at moderate temperatures (~300 ^{o}C). However, a more detailed study is required for an in depth comprehension of the synthetic parameters that will enable the production of supported Cu NPs with desirable particle size distribution and enhanced catalytic activity.

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References: [1] J. Zhu et al., Appl. Catal. B: Environm., 130, 197-217 (2013), [2] H. Song et al., J. Am. Chem. Soc., 128, 3027-3037 (2006), [3] E.G. Deze et al., Microp. Mesopor. Mater., 235, 107-119 (2016).

Influence of ITO thickness on the optical and electrical properties of the ITO/ZnO/glass bi-layers deposited by pulsed D.C. magnetron sputtering for chalcogenide photovoltaics

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In this work we compare the influence of the ITO thin film thickness in the glass/i-ZnO/ITO bi-layer structure used in CIGS thin film solar cell as a TCO bi-layer system. The characterization of the structures was done from the optical and electrical point of view. Apart from the basic physics of TCO materials our research had focused on the optimization of the deposition process. The development thus focuses on scaling up the processes on large areas and maximizing deposition rates and material utilization. In the approached deposition the main considered goal was the compatibility with industrial applications, namely this work refers to deposition of TCO films at moderate substrate temperature to the growth of ultra smooth high performance films with low thickness. Low resistivity (10-3 Ωcm) and high average transmission in the 400-800 nm range (≈88%) have been obtained for the bi-layer configuration. A special attention to the impact of the growth parameters like temperature, pressure and distance between the substrate and the target on the physical properties of the bi-layer was assigned.

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