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Catalytic dehydration of methanol to dimethyl ether (DME) using the $Al_{62,2}Cu_{25,3}Fe_{12,5}$ Quasicrystalline alloy

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Abstract

Dimethyl ether (DME) has been considered a potential and promising energy alternative for petroleum subproducts due to its good burning characteristics, and to its high cetana content which is superior to that of diesel. Furthermore, DME can be considered a cleaner fuel than diesel. DME can be produced by dehydration reaction of methanol by using solid catalysts in catalytic reactions. This study shows an analysis of the performance of $Al_{62,2}Cu_{25,3}Fe_{12,5}$ quasicrystalline alloy as catalyst for dehydrating methanol to produce DME. These quasicrystalline alloys are stable at high temperatures, show a low thermal conductivity and exhibit a fragile nature, which turn them to be easily crushed. Also, their activity is not affected by water. In this research it were used the following special measurements: (i) X-Ray Diffratometry (XRD) for analyzing the phases evolution of the alloys; (ii) Scanning Electron Microscopy (SEM) in order to study the surface microstructure and (iii) Transmission Electron Microscopy –TEM for studying internal phases; quasicrystal nuclei morphologies, initial defects and for testing methanol catalytic conversion and selectivity. The latter characteristics were also analyzed for DME and for other subproducts formed in the catalyst. The study showed a good performance of the **$Al_{62,2}Cu_{25,3}Fe_{12,5}$** quasicrystalline alloy used as catalyst for DME production.

Biography

Lourdes Cristina Lucena Agostinho doing her MSc in Materials Science in UFPB with the theme: Study of Applicability of Catalytic Reactions in quasicrystals AlCuFe in Oxidation of Methanol. She is an expert in Mathematics Teaching by IMPA / UFPB. She has completed her BS in Physics from UFCG with the title search: Photoacoustic Spectroscopy System for Minerals in the Visible and Ultraviolet and Bachelor of Industrial Chemistry by UEPB has with the research: Photoacoustic Spectroscopy in the Visible and Minerals in Ultraviolet. She is currently a PhD student at the Graduate Program in Chemical Engineering from the Federal University of Pernambuco at PhD level with 15 complete articles published in national and international journals.