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Production of hydrogen and carbon nanomaterials using transition metal catalysts through methane decomposition

G. Urdiana¹, R. Valdez², G. Lastra³, M.Á. Valenzuela⁴, A. Olivas^{5*}

¹*PCeIM, Centro de Nanociencias y Nanotecnología–UNAM, CP. 22860, Ensenada, B.C., Mexico.*

²*Centro de Investigación y Desarrollo Tecnológico en Electroquímica, C.P. 76703 Querétaro, Mexico.*

³*Sección de Estudios de Posgrado e Investigación, UPIITA, Instituto Politécnico Nacional, Av. IPN 2580, 07340, Ciudad de México, Mexico.*

⁴*Lab. Catálisis y Materiales. IPN–ESIQIE, Edificio 8, tercer piso, Zacatenco, 07738, Mexico.*

⁵*Centro de Nanociencias y Nanotecnología–UNAM, CP. 22860, Ensenada, B.C., Mexico.*

Abstract

In this work, we synthesized monometallic catalysts based on Ni, Cu, Co, Mn, Fe, Zn, and W supported on Mesoporous Santa Barbara Amorphous-15 (SBA-15) to produce hydrogen and carbon nanomaterials through catalytic methane decomposition (CMD). Highly dispersed metal oxides supported on the SBA-15 surface promotes the formation of either carbon nanotubes or carbon nanofibers after CMD. Furthermore, the catalytic activity results showed the Ni/SBA-15 catalyst performed the highest methane conversion (40%) as well as it displayed superior stability during 13 h at 500 °C (23% of conversion). The resulting nanoparticle oxides, except for the Zn sample that presented a high dispersion throughout the SBA-15.

Keywords: Methane decomposition; carbon nanotubes; mesoporous materials; SBA-15.

*Corresponding author.

E-mail address: aolivas@cnyunam.mx (A. Olivas).

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