

## **Pd supported on magnetic carbon coated halloysite as hydrogenation catalyst: Study of the contribution of carbon layer and magnetization to the catalytic activity**

Samahe Sadjadi<sup>1</sup>, Giuseppe Lazzara<sup>2</sup>, [Majid M.Heravi](#)<sup>3</sup>, Giuseppe Cavallaro<sup>2,4</sup>

1- Gas Conversion Department, Faculty of Petrochemicals, Iran Polymer and Petrochemicals Institute, PO Box 14975-112, Tehran, Iran

2- Dipartimento di Fisica e Chimica, Università degli Studi di Palermo, Viale delle Scienze, pad. 17, Palermo, 90128, Italy

3- Department of Chemistry, School of Science, Alzahra University, PO Box 1993891176, Vanak, Tehran, Iran

4- Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali, INSTM, Via G. Giusti, 9, Firenze, I-50121, Italy

### **Abstract**

In this article, a magnetic carbon-coated halloysite nanoclay (Hal) was prepared through introduction of hydrothermally carbonized glucose (Glu) on Hal followed by the immobilization of magnetic nanoparticles (MNPs) and incorporation of resorcinol-formaldehyde polymeric shell (RF) and carbonization. The resulting composite was then successfully applied for the immobilization of Pd nanoparticles to afford Pd@Hal@Glu-Fe-C that could efficiently promote hydrogenation of nitroarenes in the aqueous media at low temperature. The catalyst exhibited high selectivity toward nitro group. Moreover, it was highly recyclable with low MNPs and Pd leaching. To elucidate the contribution of each component of the support to the catalysis, a precise study was carried out by preparing several control catalysts and

**Source:** Sadjadi S, Lazzara G, [Heravi MM](https://doi.org/10.1016/j.clay.2019.105299), Cavallaro G. Pd supported on magnetic carbon coated halloysite as hydrogenation catalyst: Study of the contribution of carbon layer and magnetization to the catalytic activity. Appl Clay Sci. 2019;182. <https://doi.org/10.1016/j.clay.2019.105299>

comparing their catalytic activities with that of Pd@Hal@Glu-Fe-C. Furthermore, the effect of carbon source used for the formation of hydrothermally derived carbon -wrapped Hal and the order of incorporation of metallic nanoparticles on the catalytic activity of the final catalyst was investigated.

**Keywords:** Halloysite, Carbon shell, Magnetic, Composites, Hydrogenation