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HALLOYSITE NANOTUBES AS SUPPORT FOR METAL NANOPARTICLES FOR CATALYTIC APPLICATION

Carmelo G. Colletti (1)*, Marina Massaro (1), Serena Riela (1), Giuseppe Lazzara (2), Yusuf Darrat (3), Yuri Lvov (3)

(1) Department of Biological, Chemical and Pharmaceutical Sciences and Technology (STEBICEF), University of Palermo, Palermo, Italy, (2) Department of Physic and Chemistry), University of Palermo, Palermo, Italy, (3) Institute for Micromanufacturing, Louisiana Tech University, Ruston, LA

Halloysite (HNT) is a natural clay that, in the last years, has shown an important increasing on various applications in different field of interesting.

Chemically similar to kaolin, it shows the predominately rolled shape, to form multilayers tubes of nanometric dimensions.

The different chemical composition of the inside lumen (Al-OH) surface and outside (Si-O) give to the tubes a partial negative charge outside and positive inside. In this way, it is possible to get different interactions of different molecules or systems selectivity on one or another surface.

The selective functionalization, covalent or not, of the HNT lumen or outer surface, gives the possibility to the nanotubes to further expand and modulate their properties, increasing the potential efficacy and the application fields.

Recently some studies are, also, focused on the edges and interlayer properties and potentials.

Among the countless applications of halloysite, is central the nanotube ability to interact with metals.

Metals ions are one of the worst pollutants in the environmental contest. Halloysite has shown interesting properties as starting point to make environmental recovery system.

Another important application of the ability of HNT of interaction with metals is catalysis.

Catalyst immobilization is a good opportunity to obtain materials that can be recovered and reused for several cycles with low leaching.

Several studies have been carried out on the use of ionic liquids as reaction media and as stabilizers for metal nanoparticles. In particular, great attention has been devoted to the use of supported ionic liquid phase (SILP)-based materials as heterogeneous recyclable palladium catalyst.

Herein are reported some recent developments about immobilization of metal nanoparticles on halloysite nanotubes and studies about the materials and applications.

[1] Massaro M., Riela S., Cavallaro G., Colletti C.G., Milioto S., Noto R., Parisi F., Lazzara G. (2015). Palladium supported on Halloysite-triazolium salts as catalyst forligand free Suzuki cross-coupling in water under microwave irradiation. Journal of Molecular Catalysis A: Chemical, 12-19.

[2] Massaro M., Schembri V., Campisciano V., Cavallaro G., Lazzara G., Milioto S., Noto R., Parisi F., Riela S. (2016) Design of PNIPAAM Covalently Grafted on Halloysite Nanotubes as a Support for Metal-Based Catalysts. RSC Advances. 55312-55318.