SYNTHESIS OF Pt HIERARCHICAL NANOSTRUCTURES BY ELECTRODEPOSITION AND CHEMICAL REDUCTION FROM BICONTINUOUS MICROEMULSIONS AND THEIR ELECTROCHEMICAL CHARACTERIZATION

Margarita Sanchez Dominguez\textsuperscript{1}, Elijah Temitope Adesuji\textsuperscript{1}, Marcelo Videa\textsuperscript{2}

\textsuperscript{1}Centro de Investigación en Materiales Avanzados, S.C., Unidad Monterrey, Mexico. \textsuperscript{2}Instituto Tecnológico y de Estudios Superiores de Monterrey, Departamento de Química y Escuela de Ingeniería y Ciencias, Mexico.

There are many reports on the use of W/O microemulsions, and to a lesser extent O/W microemulsions for the synthesis of inorganic nanoparticles [1,2]. In contrast, the use of bicontinuous microemulsions is less common. For example, metallic NPs such as Pt and Ag NPs has been carried out [3,4]. The motivation was to increase the yield of nanoparticles obtained per microemulsion volume, keeping a narrow particle size. The precursors used were incorporated in the aqueous phase by using water-soluble precursor salts; well-dispersed spherical NPs were formed. Since in a bicontinuous microemulsion, both the oil and the aqueous phase have nanometric channels, it is feasible to use oil-soluble precursors and still obtain nanostructures. In this investigation, we used bicontinuous microemulsions based on the system water/Synperonic 91/5 /iso-octane for the synthesis of Pt nanostructures. The use of both water- and oil-soluble Pt precursor were compared. Hierarchical superstructures made by interconnected NPs or nanoneedles were obtained, both by chemical reduction and electrodeposition. Porous Pt nanoparticle networks have received attention for their use as electrocatalysts. Cyclic voltammetry allowed to estimate the surface area of these materials, resulting in values between 8 and 35 m\textsuperscript{2}/g. These values are comparable to the high-range surface areas obtained for porous Pt materials synthesized by more complicated methods. These results demonstrate the usefulness of employing certain bicontinuous microemulsion systems for the synthesis of hierarchical nanostructures.

Abstract References:
1 M. Boutonnet et al., Colloids Surfaces, 1982, 6, 209.
2 M. Sanchez-Dominguez et al., Curr Opin Colloid Interface Sci 2012, 17, 297.
3 R. Latsuzbaia et al., Faraday Discuss. 2015, 181, 37.

Keywords: nanoreactor, microemulsion, Pt superstructure

Presenting author’s email: margarita.sanchez@cimav.edu.mx