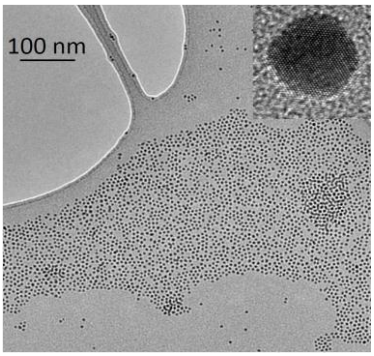
Phd offer: Percolating Pd nanoparticles system for H_2 separation

Sector: The clean fuel of the future: Hydrogen

Description: In the future hydrogen economy, cost-effective and efficient ways of separating hydrogen from other species remain a challenge. Mixed Matrix Membranes", combining nanoscale distributed inorganic fillers in a polymer matrix, can improve the performance of pure polymer membranes and overcome the brittleness problems inherent in inorganic parts. Based on recent work carried out within our research consortium, we propose to study at low temperature (T < 100°C) the absorption/desorption efficiency of a percolating network of 3-5 nm diameter Pd NPs. As far as the polymer matrix is concerned, we have chosen room-temperature glassy polymers such as cellulose acetate and polysulfone because of their chemical/mechanical stability, and which are known to be used as high-performance gas separation membranes.

The resulting membranes will be characterized by electrical conductivity, electron microscopy and gas transport experiments. These studies should provide a better understanding of the mechanisms involved in gas transport across membranes, and define the dominant phenomena that occur during gas diffusion at the nanometric scale. Indeed, gas diffusion across membranes is the result of a combination of several phenomena whose contribution may vary according to the nature of the membrane (composition and structuring). We therefore plan to modify the diameter of the Pd NPs in the percolating system, thereby promoting the diffusion process in solution, and/or to use the dielectrophoresis technique to create nanostructuring of the NPs during composite processing. In this case, we should be able to increase the number of Pd NPs percolation clusters and promote hydrogen diffusion.



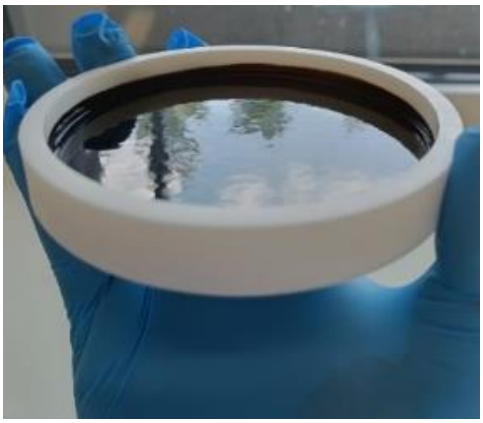
Skills and qualifications: An interest in research and a background in chemistry is highly recommended. Experience in both chemical synthesis and material characterization (spectroscopy UV-vis, electron microscopy) will be a strength.

Academic Background: Master degree in Chemistry or Material engineering

Dates: From Sept-October 2024

Funding: Doctoral school of Chemistry

Location : LMI, Campus LyonTech la Doua, Université Claude Bernard LYON1, Bd Chevreul, 69622 Villeurbanne cedex.



Contact: Please send your applications (including the CV, motivation letters, master's certificate with grades) to arnaud.brioude@univ-lyon1.fr