

Composite nanofibers containing ruthenium nanoparticles stabilized by cyclodextrin polymers: Synthesis, characterization and their application in heterogeneous catalysis

Sami Fadlallah^{1,2}, Frédéric Cazaux¹, Nicolas Tabary¹, Bernard Martel¹, Eric Monflier², Bastien Léger² and Sébastien Noël²

¹Unité Matériaux et Transformations - Université de Lille, France

²Unité de Catalyse et Chimie du Solide, France

The synthesis of functional nanofibers containing noble metal nanoparticles (NPs) is of growing interest, notably due to their application in different fields such as catalysis, medicine and sensing. These systems exhibit particular characteristics and they are defined by their high surface area of stabilized active metals. However, the size and homogeneous distribution of the incorporated metal NPs should be taken into consideration in order to reach the high performance and efficiency. Herein, we report the synthesis of composite nanofibers of poly vinyl alcohol (PVA)/poly citric acid- β -cyclodextrin (PCD)/RuNPs. The new approach includes the preparation of a series of Ru colloidal

nanosuspensions stabilized with PCD, then the dissolution of PVA polymer which constituted the matrix of nanofibers during the electrospinning phase. Rheological study showed that the viscosity depends on both the molecular weight of PVA and amount of reducing agent; NaBH₄. These heterogeneous catalysts were fully characterized by TEM, SEM, TGA and DSC. Moreover the effect of NaBH₄ (NaBO₂) as a physical cross linking agent was studied by heat treatment of electrospun nano fibers and the activity of the prepared catalysts was evaluated in the catalytic hydrogenation reactions in liquid phase.

sami.fadlallah@hotmail.com