Immobilization of nanocatalysts-containing polymeric carriers onto solid surfaces

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This study is concerned with the attachment of electrostatically stabilized polymeric microgel particles based on poly(acrylic acid), PAA, poly(methacrylic acid), PMAA, and poly(2-(diethylamino)ethyl methacrylate), PDEAEMA, onto inorganic surfaces. These microgels have been synthesized as hosts for the impregnation of metal nanoparticles (Ru, Pd, etc.), which will be utilized as nanocatalysts for various catalytic reactions of industrial interest carried out in microfluidic reactors. The attachment of the microgel particles onto glass substrates can be significantly improved by the utilization of functional groups, such as carboxylic acid moieties present on the surface of the microgels. Various routes were followed in order to deposit the particles onto the surfaces, such as the Pickering emulsion method, which is to trap the particles at the interface between two fluids [1]. Parallel to the above procedure, an amine coupling method was introduced, which leads to the covalent binding of the microgel particles onto the surface. The durability of the microgel particles attached onto the surfaces against hydration and shear forces was tested utilizing repeated immersion of the surfaces into water undergoing mechanically-generated hydrodynamic flow.

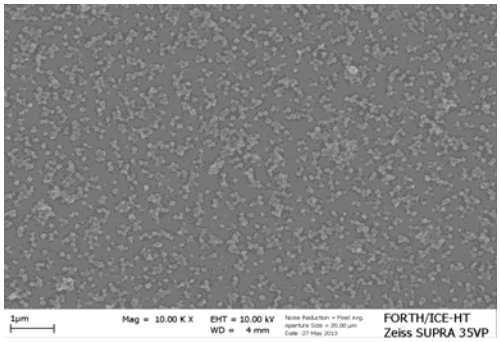

Figure 1: PMAA microgels carrying **Pd** nanocatalysts attached onto a glass surface with the amine coupling procedure.

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References

[1] M. Kaliva, M.A. Frysali, C. Flouraki, L. Papoutsakis, M. Vamvakaki and S.H. Anastasiadis, Macromol. Symp. **331**, 17-25 (2013).

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