FEMS EUROMAT2013
European Congress and Exhibition on
Advanced Materials and Processes

Washcoat deposition of $Ni/MgAl_2O_4$ catalysts for steam reforming reaction on metallic open-cell foams

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Preparation of active washcoats of $Ni/MgAl_2O_4$ steam-reforming catalysts on FeCrAlloy foams is reported in this work. The $MgAl_2O_4$ powdered support was prepared via a co-precipitation method, and $Ni/MgAl_2O_4$ was obtained via dry impregnation of 10% (w/w) of Ni.

The support geometry determines the washcoating technique, which requires a proper slurry rheology, obtained by proper formulation, while the properties of the final washcoats: loading, thickness and adhesion, depend on the physico-chemical and rheological properties of the suspensions and on the nature of the surface of the geometrical support.

Accordingly, after full characterization of the powders, the deposition of the catalyst over the foams was performed (Figure 1). The washcoat layer can be deposited on FeCrAlloy foams via both dip- and percolation-blowing techniques, however, the highly reproducible percolation-blowing process seems the technique of choice for future industrial applications.

The proportions of the slurry components have been evaluated "a priori" by analyzing pore volume, surface nature and surface charging of the catalyst powders. Good washcoat loadings can be obtained that result in an acceptable catalytic covering of the metallic foam matrix and in a good adhesion of the active layer. The so prepared catalysts were found to be active in the methane steam reforming process, having performances similar to those reported in the literature for state-of-the-art $Ni/MgAl_2O_4$ powdered catalysts, prepared according to different procedures.

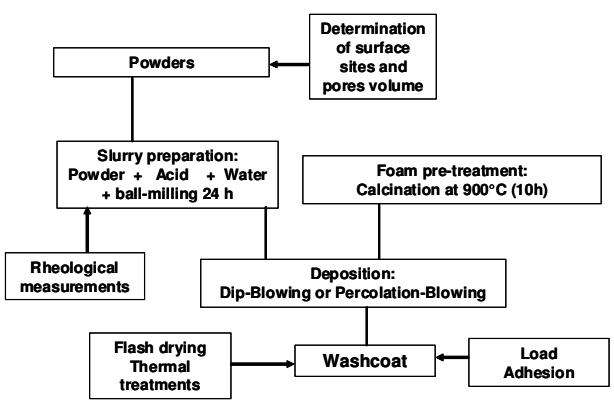

Figure 1 – Washcoating procedure

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