

272h Hydrothermal Synthesis of Inorganic and Organic Nanocomposite Zsm-5 Films from Recycled Solution

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As-synthesized ZSM-5 coatings have been shown to be remarkably corrosion resistant in acids, bases and pitting-aggressive solutions [1-2]. The coatings previously reported have been synthesized by in situ crystallization using fresh synthesis solutions. Our study has shown however that the silicon utilization rate after one synthesis is fairly low (13.3%). Thus we have attempted and shown that the synthesis solution can be re-used for multiple times and therefore the cost of the coating can be reduced significantly. It is interesting to note that although the synthesis is carried out at 175°C where the organic structure directing agent (tetrapropylammonium hydroxide) is long believed to be decomposed, our data show that high quality coatings can be produced without adding TPAOH before each re-use. The coatings were characterized by XRD, SEM and EDaX, ICP, XPS, TGA, dc polarization methods, and shown to be highly corrosion resistant. The parameters that influence the coating formation from recycled solutions were studied. pH values of recycled solutions were found to play a crucial role in coating formation.

Reference

[1] X. Cheng, Z. Wang, and Y. Yan, *Electrochem. Solid-State Lett.*, 4, B23 (2001).

[2] A. Mitra, Z. Wang, T. Cao, H. Wang, L. Huang, and Y. Yan, *J. Electrochem. Soc.*, 149 (10), B472 (2002)