Preparation of Continuous Highly Hydrophobic Pure Silica ITQ-29 Zeolite Layers on Alumina Supports

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Hydrophobic membranes have been attracted much attention for the separation of molecules based in their polarity and highly hydrophobic pure silica ITQ-29 zeolite may result in a good candidate to carry out such separations. Continuous layers of intergrown ITQ-29 zeolite crystals were successfully grown on porous alumina supports by optimization of the synthesis conditions, such as the appropriate selection of the seeds, the procedure for the gel preparation, and the calcination conditions. This resulted in the formation of all silica ITQ-29 zeolite layers without the presence of germanium required in previously reportedITQ-29 membranes [1], with the subsequent improvement in quality and stability, as verified by the absence of cracks after calcination. We have proved that the incorporation of aluminum from the support into the zeolite layer does not occur, neither during the secondary growth nor through migration of aluminium species during calcination.

The water content of the synthesis gel was adjusted after the silica precipitation, hence resulting in a viscous gel rather than a solid material, thus favouring a better contact with the seeded support. In this way, continuous layers of 8 μm thickness were prepared after 7 days of secondary growth, and were activated by calcination at 773 K in air, resulting in crack-free microporous membranes.

The incorporation of aluminum from the support into the zeolite layer did not occur, neither during the secondary growth nor through migration of aluminum species during calcination. The materials obtained were defect-free and crystalline, being appropriate candidates for bioalcohols [2] separation in aqueous solutions.

REFERENCES

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FIGURES

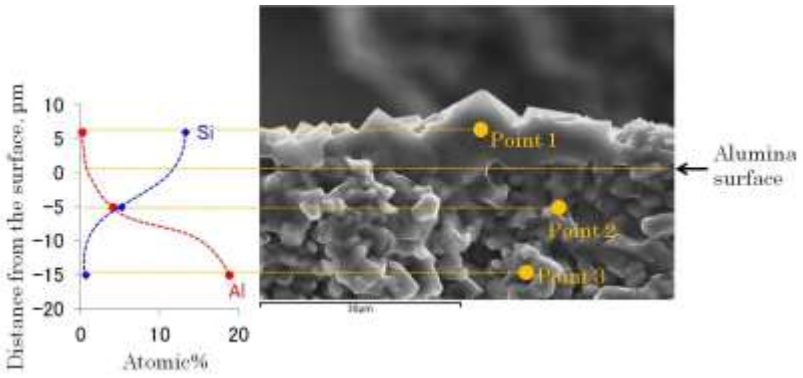

Figure 1: Si and Al composition along the ITQ-29 material grown on the alumina support.