Synthesis of polyurea aerogels with first-row transition metal catalysts

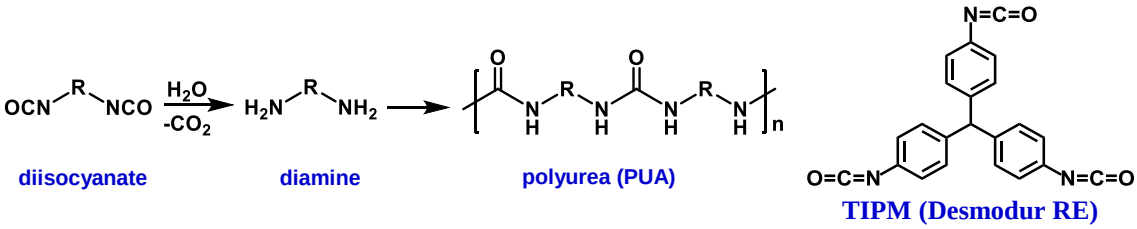
Eleni Effraimopoulou, Despoina Chriti, Maria Papastergiou, Grigorios Raptopoulos, Patrina Paraskevopoulou

Laboratory of Inorganic Chemistry, Department of Chemistry, National and Kapodistrian University of Athens, Panepistimiopolis Zografou, 15771 Athens, Greece

email: eleffraim@chem.uoa.gr

Aerogels are solid materials with nanometer-scale pores showing interesting properties (e.g., high porosity, low density, and low thermal conductivity) for a range of applications. They are derived from drying wet gels by turning the pore-filling solvent into a supercritical fluid, thus maintaining the nanostructure of the gel.[1] Among synthetic polymer aerogels, polyurea aerogels can be synthesized *via* the nucleophilic addition of water to polyisocyanates using amines as catalysts (Scheme 1).[2,3]

In this work, we present the synthesis and characterization of polyurea aerogels from the reaction of an aromatic/rigid triisocyanate, Desmodur RE (TIPM), with water using first row transition metal salts as catalysts, instead of amines. The resulting wet-gels were dried with supercritical fluid (SCF) CO_2. They have porosities up to 90% v/v and high surface areas (up to 524 m^2 g^{-1}). Pyrolysis and/or etching of those polyurea aerogels provide metal-doped carbon aerogels.



Scheme 1. *Synthesis of polyurea aerogels.*

Acknowledgements

This project has received funding from the *European Union´s Horizon 2020 research and innovation programme* under grant agreement No 685648. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use, which may be made of the information contained therein. We are also thankful to Covestro for kindly providing Desmodur RE.

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