

IONIC LIQUID TAILORED CARBON AEROGELS

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Mesoporous carbon aerogels of a wide range application potential are most frequently obtained from resorcinol-formaldehyde (RF) hydrogel precursors. The sol-gel process used in the synthesis provides an efficient and versatile means of product control by systematic variation of process conditions such as pH, stoichiometry, additives, drying conditions, etc. The porosity of dried resorcinol-formaldehyde (RF) gel is conserved when to polymer is converted to carbon.

The use of room temperature ionic liquids (RTILs) as a novel medium is an expanding field of interest. Despite of their high prize they are one of the most promising solvents/reaction media of the future for their numerous beneficial properties (non-flammable, low vapour pressure, high temperature stability, etc.). When resorcinol-formaldehyde gels are synthesized in RTILs they are not a simple reaction medium but may concurrently act as catalyst and/or template.

The effect of various alkyl-substituted imidazolium based RTILs on the morphology of RF based carbon aerogels will be compared in the low water concentration range. One of these RTILs, namely 1-ethyl-3-methylimidazolium methyl sulfate has been also studied in a wide water concentration range to reveal if the internal structure of the binary solvent mixture influences the porous structure of the gel. The carbon aerogels have been investigated over a wide range of length scales using nitrogen gas adsorption, scanning electron microscope (SEM) and small angle X-ray scattering (SAXS) techniques.

We concluded that both the type of the RTIL and the initial water content of the RTIL/water mixture strongly affect the morphology of the carbon aerogels.