Materials chemistry and applications

Hybrid sol-gel materials doped with AgY and NaY Zeolites

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The sol-gel process is a chemical synthesis often considered as a green technology due to mild conditions preparation since is waste-free and the processing temperature is generally low (*e.g.*, close to room temperature). Also, uses compounds that do not introduce impurities into the end material and excludes the washing stage. Compared to other chemical routes, sol-gel method has several advantages in the design and synthesis of organic-inorganic hybrid (OIH) materials.[1] This method allows the control of several experimental conditions leading to a simple sequence, which may be tuned to the nature, final shape, and according to a desired function. This route allows to obtain end products with high specific porosity and surface area which favours the introduction of material's complementary functionalities, such as UV protection, anti-fouling, anti-reflection, moisture resistance, corrosion and adhesion protection. Moreover, the low synthesis temperatures minimize the thermal volatilization and degradation of the entrapped species. Therefore, the introduction of supplementary functionalities together with the enhancement of the mechanical, thermal, and optical properties, opens a wide range of applications in numerous fields of science.

This work reports the synthesis of OIH sol-gel matrices, which were obtained using a functionalized siloxane, 3-glycidoxypropyltrimethoxysilane, by reaction with an oligopolymer named Jeffamine®THF 170.[2] The OIH matrices were doped with different contents of AgY or NaY zeolites (*i.e.*, 1, 3 and 5 wt%). The doped and undoped OIH matrices were characterized by different techniques namely Fourier-transform infrared spectroscopy, electrochemical impedance spectroscopy analysis, X-ray diffraction spectroscopy and scanning electron microscopy. Results obtained so far suggest that the introduction of AY or NaY enhance the stability of the hybrid sol-gel materials and could be explored as sensors.

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References:

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