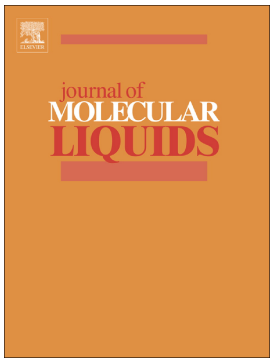

New sensors for the detection of picric acid: Ionic liquids based on polyhedral oligomeric silsesquioxanes prepared via a thiol-ene click reaction

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New Sensors for the Detection of Picric Acid: Ionic Liquids Based on Polyhedral Oligomeric Silsesquioxanes Prepared via a Thiol-Ene Click Reaction

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Abstract:

In this study, four hybrid ionic liquids (ILs) based on polyhedral oligomeric silsesquioxanes (POSS) were synthesized via a thiol-ene click reaction for the first time. These ILs based on POSS (ILs-POSS) exhibited not only excellent thermal stabilities but also low glass transition temperatures. ^{1}H, ^{13}C, and ^{29}Si NMR and Fourier transform infrared spectra (FTIR) spectroscopy were used to confirm the structures of the ILs-POSS. Furthermore, in selected solvents, the ILs-POSS were observed to have spherical vesicle structures as a result of their interesting self-assembly behaviors. In addition, these four ILs exhibited high sensitivity for the detection of a nitroaromatic compound, picric acid, detecting picric acid at a concentration of $1*10^{-9}M$. These data demonstrated that these four novel ILs have great potential for the detection of explosives such as picric acid. In conclusion, this study describes new materials composed of POSS as fluorescent sensors exhibiting excellent efficiency and sensitivity in the detection of picric