

Electrolytes for EC devices based on sol-gel processable organic-inorganic hybrids or ionic liquids

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ABSTRACT

Electrolytes play an important role in electrochromic devices, enabling their functioning and assuring long-term exploitation times, but despite numerous investigations they still remained the weakest part of the whole systems. The approach that can be used for their preparation is also sol-gel processing. For instance, various trialkoxysilane functionalised organic-inorganic hybrids can be applied for their preparation, being characterised by hydrolysable reactive trialkoxy groups which can undergo hydrolysis (solvolysis) and condensation¹, while the Si-C bonds remained attached to the silicon during the sol-gel processing. When the alkyl groups bear certain organic functionality (acrylic, isocyanato, epoxy, vinyl, etc.) trialkoxy silanes could be additionally cross-linked in three dimensional gels, which often exhibit multifunctional properties. Another possibility is the preparation of bis end-capped precursors, trialkoxysilyl functionalised from the both sides of a long polymer molecules, for example (poly)ethyleneoxide, which beneficially influenced the solubility of various lithium salts. The sol-gel approach, however, can be used also with ionic liquids, which have become important as alternative electrolytes in various iono-optic and electrochemical devices. Instead of solidification of ionic liquids with solid particles, small molecular weight gellators or entrapment in polymeric matrices, the ionic liquids with polymerisable anion or cation (acryl, vinyl,...) can be synthesised and polymerised in-situ during preparation of EC devices. Moreover, in our laboratory we synthesised a set of alkoxy functionalised imidazolium-based ionic liquids² with different anions (iodide, chloride, bromide, mesylate) which were employed in EC devices with organic conductive polymers as optically active electrode and also in hybrid EC devices with redox I₃⁻/I⁻ electrolyte.

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