Accepted Manuscript

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PII: S0925-4005(17)32486-3

DOI: https://doi.org/10.1016/j.snb.2017.12.153

Reference: SNB 23841

To appear in: Sensors and Actuators B

Received date: 9-10-2017 Revised date: 1-12-2017 Accepted date: 22-12-2017

Please cite this article as: Nerea Gil-González, Tugce Akyazi, E.Castaño, F.Benito-Lopez, M.C.Morant-Miñana, Elucidating the role of the ionic liquids in the actuation behavior of thermo-responsive ionogels, Sensors and Actuators B: Chemical https://doi.org/10.1016/j.snb.2017.12.153

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ACCEPTED MANUSCRIPT

Elucidating the role of the ionic liquids in the actuation behavior of thermo-responsive ionogels

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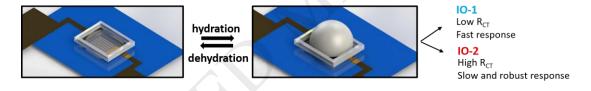
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Research highlights:

- Charge transfer resistance depends on the porosity and chemical structure of the ionogel
- Ionogels with polar ionic liquids are excellent for fast response applications
- Nonpolar ionic liquids result in ionogels with more robust actuator behavior

Graphical abstract



Abstract

The characterization of a thermo-responsive ionogels with electrochemical impedance spectroscopy using gold interdigitated electrodes is described. The ionogel is synthesized using poly(*N*-isopropylacrylamide) as thermo-responsive gel and polymerized in the presence of two ionic liquids: ethyl-3-methylimidazolium ethyl sulfate or trihexyltetradecyl-phosphonium dicyanamide. The changes on the charge-transfer resistance show a clear dependence on the porosity and on the chemical structure of the ionogel. Moreover, the charge-transfer resistance parameter can be used to track in real time the photopolymerization and the hydration process of the ionogels. After exposing them to several drying/rehydration cycles the switching performance is fully understood. The results show that the ionogel with 1-ethyl-3-methylimidazolium ethyl sulfate requires less time to absorb and release water and

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