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(54) Title: CONDUCTIVE COMPOSITE ARTICLES BASED ON EXPANDABLE AND CONTRACTIBLE PARTICULATE MATRICES

(57) Abstract

The invention provides a composite article (24) whose electrical and/or thermal conductivity undergoes a significant change in response to variations in one of several externally controlled thermodynamic parameters, such as temperature, pH, ionic strength, and solvent composition. The composite article (24) is formed by at least three components: conductive filler particles (22), cross-linked polymeric particles (10/12) that are swellable and deswellable, and a solvent mix (20). In the deswollen state, the gel particles (10) occupy a relatively small volume fraction of the composite article (24), allowing the conductive filler particles (22) to be discrete, fully suspended, and free flowing in the solvent mix (20). Upon switching to the swollen state, the interstitial volume of the composite article (24) between the cross-linked gel particles (12) diminishes, forcing the conductive filler particles (22) to come into intimate contact with one another, thus creating a conductive percolation network (26). As a result of contact between the conductive filler particles (22), the electrical and/or thermal conductivity of the composite article (24) is increased.

