Abstract Submitted
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Ionomer Design Principles for Single Ion-Conducting Energy Materials[1] RALPH COLBY, SIWEI LIANG, WENJUAN LIU, U. HYEOK CHOI, JAMES RUNT, HUAI-SUEN SHIAU, MICHAEL JANIK, Penn State University — Single-ion conducting ionomers with low glass transition temperature, high dielectric constant and containing bulky ions with diffuse charge, are needed for polymer membranes that transport small counterions. Overarching design principles emerging from quantum chemistry calculations suggest that diffuse charge can be attained from simple considerations of atomic electronegativity. For lithium or sodium batteries, perfluorinated tetraphenyl borate ionomers with solvating polar comonomers are proposed. For fluoride or hydroxide batteries and for iodide transporting solar cells, tetraalkyl phosphonium ionomers with anion receptors are proposed. First attempts to construct such ionomers to test these ideas will be discussed, with results from dielectric spectroscopy to measure conductivity, dielectric constant and number density of simultaneously conducting ions.

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Ralph Colby
Penn State University

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