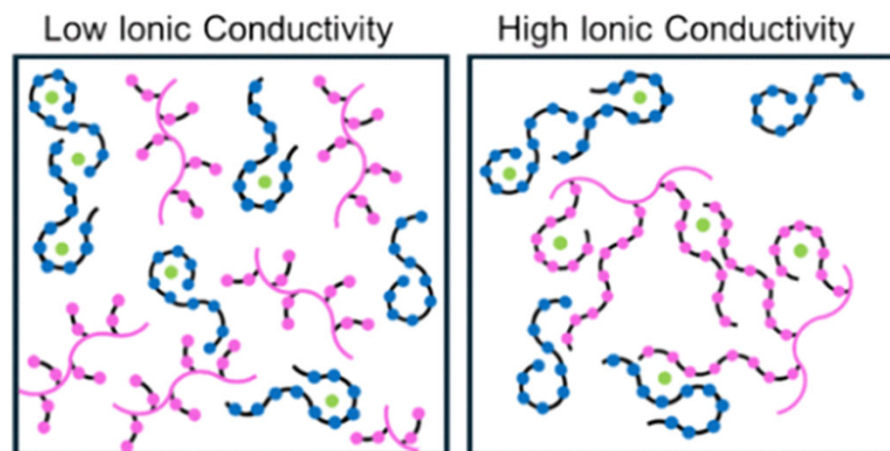


Tuning Polymer Structure in Polymer Blend Electrolytes

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Polymer blend electrolytes will increase battery safety compared to conventional liquid electrolytes used in today's rechargeable batteries due to their improved stability against Li metal and improved mechanical properties. By mixing two or more polymers together, the electrolytes possess optimized properties not typically found in single-component materials. However, in order to deploy polymer-based electrolytes in today's technologies, more fundamental insights into how ions are transported within a polymer matrix are needed.

Wisconsin MRSEC researchers investigated the effect of polymer molecular structure on the blend properties and ion transport capabilities. Increasing the side chain length of one polymer improved solvation of Li ions and increased ionic conductivity. These insights will inform the design of next-generation battery electrolytes with improved performance.



A blend of two polymers, one blue, one pink. (left) The pink polymer has short side chains and does not solvate the Li ions, shown in green. The result is low ionic conductivity. (right) The pink polymer with longer side chains solvates Li ions, resulting in higher ionic conductivity.