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### **Title**

Charge Transport Studies of Proton and Ion Conducting Materials

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### **Degree Name**

Doctor of Philosophy (PhD)

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Physics

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## Subject Categories

Physics

## Abstract

The development of a high-throughput impedance spectroscopy instrumentation platform for conductivity characterization of ion transport materials is outlined. Collaborative studies using this system are summarized. Charge conduction mechanisms and conductivity data for small molecule proton conducting liquids, pyrazole, imidazole, 1,2,3-triazole, 1,2,4-triazole, and select mixtures of these compounds are documented. Furthermore, proton diffusivity measurements using a Pulse Field Gradient Nuclear Magnetic Resonance (PFG NMR) technique for imidazole and 1,2,3-triazole binary mixtures are compared. Studies of azole functionalized discotic and linear mesogens with conductivity, structural, and thermal characterizations are detailed.

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