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Ionic conductivity of imidazole-functionalized liquid crystal mesogens SUPACHAREE RODDECHA, MITCHELL ANTHAMATTEN, University of Rochester — Imidazole has been investigated as a novel anhydrous proton conducting functional group that could enable higher temperature operation (> 120 °C) of polymer electrolyte fuel cells. Its amphoteric behavior can support Grotthuss-like proton transport; however molecular mobility and a high concentration of imidazole groups are needed to achieve high ionic conductivity. Our hypothesis is that liquid crystal ordering, particularly in layered smectic phase, can facilitate formation of 2D proton transport and promote proton conductivity. We have designed and synthesized two imidazole-terminated liquid crystal mesogens, and the ionic conductivities in the liquid crystalline and isotropic states have been measured. Here we report on synthesis and characterization of diacylhydrazine liquid crystals bearing imidazole terminal groups. The proton conductivity of products is compared to pure liquid imidazole and to liquid crystal mesogens without imidazole groups.

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