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Ionic liquid-crystalline network polymers formed by sulfonic acid-containing polysiloxanes and pyridinium compounds

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ABSTRACT:

Self-assembly of both ionic aggregates and mesogens in one polymer system represents the capability integrating intermolecular interactions and functions of materials. A series of ionic liquid-crystalline network polymers (ILCNs) containing cholesterol derivatives, siloxane backbone and ionic pyridinium sulfonic groups are synthesized, and the characterization, self-assembly behavior, and possible applications are discussed. The ILCNs are made from sulfonic acid-containing precursor polymers synthesized by use of cholest-5-en-3-ol-(3 β)-4-(allyloxy)benzoate, 4-(allyloxy)benzenesulfonic acid and poly(methylhydro)siloxane. The ILCNs show a cubic mesophase and a smectic A (SmA) mesophase. The SmA layers develop saddle splay curvature and adopt the shape of infinite minimal surfaces, therefore self-assembly of bicontinuous cubic phases takes place due to ionic electrostatic attraction and asymmetry derived from the chiral cholesterol elements. Large ionic conductivity and remarkable thermal stability of the ILCNs provide promising

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