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Surface-bonded amide-functionalized imidazolium ionic liquid as stationary phase for hydrophilic interaction liquid chromatography

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Highlights

- A novel imidazolium-embedded amide stationary phase was prepared for HILIC.
- The prepared column possessed anion-exchange/HILIC mixed-mode retention mechanism.
- The stationary phase exhibited superior HILIC separation performance.

Abstract

The amide group modified silica materials are popular stationary phases for hydrophilic interaction liquid chromatography (HILIC). Meanwhile, surface-confined imidazolium ionic liquids (ILs) have been proved to be useful HILIC stationary phases and possess many unique properties. In this study, the synthesis of an amide-functionalized imidazolium IL was conducted which was then bonded onto silica surface to obtain a novel imidazolium-embedded amide stationary phase for HILIC. The combination of the amide group and imidazolium IL moiety might bring some advantages in selectivity or retention and therefore extended its applications. After characterizing the prepared IL and the resulting modified silica materials, the chromatographic performance and separation selectivity of the packed column were evaluated and compared with a commercial amide column. Then, the retention behavior was investigated through observing the retention factors at different chromatographic conditions using a wide range of compounds. Exceptionally, the prepared amide IL column exhibited superior separation performance towards complex samples such as flavonoids mixture, soybean flavonoids and human urine. All the results indicated that the novel amide IL column possessed an