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Pore Size Effect of Mesoporous Silica Stationary Phase on the Separation Performance of Microfabricated Gas Chromatography Columns

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Highlights

- A semi-packed micro GC column has been fabricated by MEMS technique.
- Mesoporous silica is an effective μGC stationary phase to separate alkanes.
- Larger pore size of stationary phase leads to longer retention time.

Abstract

Microfabricated semi-packed gas chromatography (GC) columns coated with two kinds of mesoporous silica (MS) stationary phase have been explored and compared in this paper. The micro GC (μGC) columns are fabricated by microelectromechanical system (MEMS) technique. MSs with pore size of 2 and 5 nm are prepared using two different soft-templates and deposited on the inner surface of the μGC columns by dip-coating. For the first time, the influence of pore size of MS stationary phase on the separation performance in a μGC column has been investigated. As demonstrated, the mixtures of light alkanes (C1-C4) or heavy alkanes (C5-C10) can be well separated in both columns, where the separation resolution is always higher than 1.25 except for C1-C2 and C5-C6. Considering the pore size effect on the separation performance, it is