Poster

Carbon nanotube-based MEMS devices : Gas sensor application

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Taking advantage of the technology developed for integrated circuits during the past few decades, MEMS technology has allowed the development of innovative sensors, with an increase in microsystems miniaturization and complexity [1].

Chromatography is a laboratory technique that covers a wide range of applications in liquid or gas analysis from pharmaceutical to oilfield industries. Since the late 1970s, efforts have been directed towards the fabrication of on-chip gas chromatography sensors. While performances are improved with the miniaturization of MEMS chromatography columns, the deposition of uniform and well-controlled stationary phases inside these microscale silicon channels has remained challenging [2].

Self-assembling nanomaterials are particularly interesting for the purpose of coating and functionalization of microstructures. As part of the development of a MEMS gas chromatograph, our on-going work concerning nanotubes coated micro-columns will be presented. With their gas adsorption properties and high surface/volume ratio, nanotubes are indeed an excellent alternative material to replace some of the classical stationary phases used today [3,4]. Using microfabricated channels covered with carbon nanotubes mats, we have demonstrated separation of light hydrocarbons as well as some of the permanent gases in few tens of seconds [5].

References:

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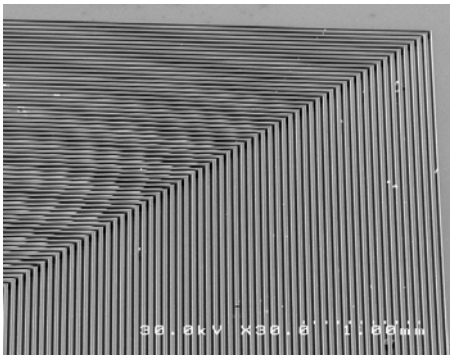
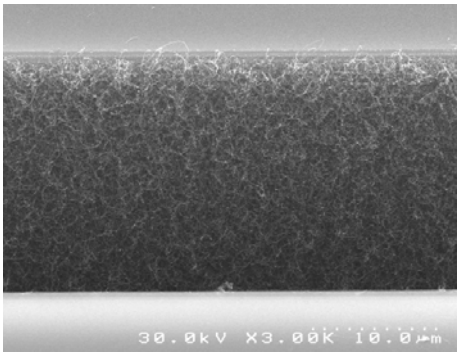
[3] Q. Li and D. Yuan, *J. Chromatogr. A*, **1003** (2003) 203–209
[4] M. Stadermann et al., *Anal. Chem.*, **78** (2006) 5639-5644
[5] B. Bourlon, J. Wong and P. Guieze, Patent pending (U.S. Application Serial No. 12/503,902.)



Microfabricated Si channels



Nanotube mat on channel walls