

Development of a micro gas chromatography column in SU-8

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Abstract

Gas chromatography (GC) is key technology in chemical analysis. Miniaturizing laboratory-size GC systems to a portable format will allow field measurements in only a few seconds, opening new sensor applications in environmental detection. The core of such a system is a high aspect ratio micro (HARM) column fabricated by the LIGA technique.

This paper reports our efforts to build a HARM column in SU-8. The design consists of a 2 m meander channel with a rectangular cross section (600 μm x 50 μm), which is patterned into a thick SU-8 layer using x-ray lithography. This structure layer is hermetic sealed between a 300 μm thick bottom layer, which is applied on a 1/2" thick PMMA substrate, and a 100 μm thick top layer, which is bonded using a flexible semi-solid transfer technique. The high aspect ratio of 12:1 and the large footprint of approximately 2 cm x 4 cm require optimization of a multi-layer SU-8 process. This optimized process is also attractive for other micro fluidic application e.g. microreactors, where free standing, pure SU-8 micro structures are desired. Preliminary flow tests will be presented showing transition times of unretained gas plugs of approx. 1 sec. No separation of uncoated SU-8 columns has been observed with the uncoated columns.