

## Fabrication of polymeric submicrometric sieves as Biosensor and Bio-capsules

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### Abstract

Submicrometric sieves are microfiltration devices that feature a homogeneous pore size distribution and low roughness on the surface. This project was proposed to study the techniques, the characterizations, and the applications of the phenomena occurring in the process of manufacturing of polymeric submicrometric sieves.

**Key words:** Sieves, lithography, polymers.

### Introduction

In recent years, there is a growing interest in the development of microelectromechanical systems (Bio-MEMS)<sup>1</sup>. The applications reached for this system are the biosensor, the bio-capsules and the micro systems (Lab on a Chip). Currently the polymers are used for these applications because of their characteristics as biocompatibility and malleability<sup>1</sup>.

Polymeric membranes with microporous and sub-microporous are an important part of the Bio-MEMS devices<sup>1</sup>.

Note that the polymeric membranes marketed has problems in its permeability and selectivity. This project seeks a uniformity in the size of pores and a regular structural morphology. In the process of fabrication of polymeric submicrometric sieves used interference lithography to achieve this uniform morphology.

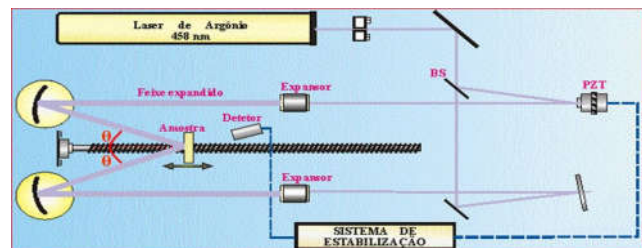
With the optimization of the interference lithography will try to obtain small pore dimension of submicrometric sieves (sub-microporous). So can be developed applications such as protein analysis and separation of virus. The goal of this project was to study the process of fabrication of polymeric submicrometric sieves with high uniformity in the distribution of pores by using interference lithography techniques in their production.

### Results and Discussion

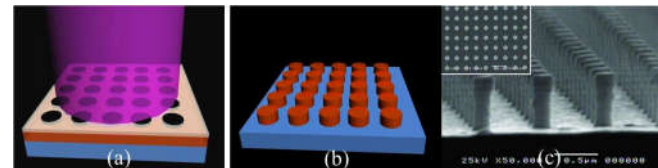
The fabrication process consists in the preparation of photoresist films and recording the structures in the film by interference lithography (Figure 1). The photoresist films should be deposited on glass substrate.

The fundamental property of the photoresist are its solubility that changes when they are exposed to a suitable wavelength light. In our case (the positive photoresist) the regions exposed to light becomes soluble. Thus, the incident light pattern is converted in a relief pattern (Figure 2).

In the process of lithography resin is exposed to a interference fringe pattern generated by the superposition of coherent beams originated from a laser.



**Figure 1.** Holographic Setup<sup>2</sup>.



**Figure 2.** Schematic of the fabrication process. (a) Double exposure (b) Typical structure expected and (c) SEM image of a typical process<sup>3</sup>.

### Conclusions

Using the technique of interference lithography and the micro molding is possible to fabricate polymeric submicrometric sieves. The reliefs obtained in photoresist films just be observed by electron microscopy. It is through electron microscopy that makes possible the characterization of the submicrometric sieves.

### Acknowledgement

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