

POROUS SEMICONDUCTORS

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The field of porous semiconductors has long been dominated by silicon. Interest in new optical, (opto)electronic and photonic systems has created a need for materials with properties different from those of silicon. In our group three approaches are used for producing porous semiconductors: assembly of pre-prepared nanoparticles, deposition in ordered templates and porous anodic etching. This talk will concentrate on the latter two concepts.

We have succeeded in producing macroporous germanium by electrodeposition in a silica template and subsequently removing the template (fig. 1) [1]. The as-deposited material is amorphous but can be crystallized by thermal treatment. Macroporous gold networks showing interesting optical properties were produced in a similar way [2].

New results on the macroporous etching of gallium phosphide are presented. Modulation of the potential during etching can be used to produce multilayer structures (fig. 2) which promise interesting applications [3]. During etching, in-situ measurements of optical properties can be used both to tune the material and to obtain information on the etching processes.

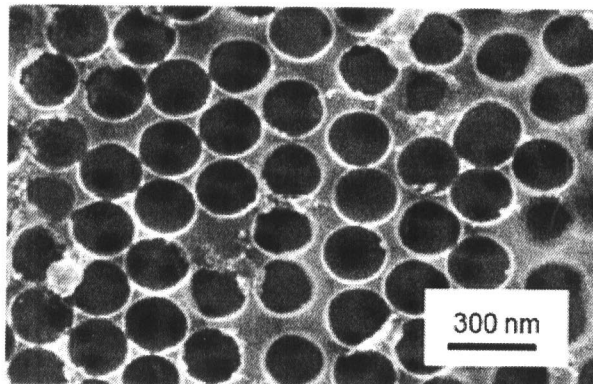


Fig. 1 Macroporous germanium

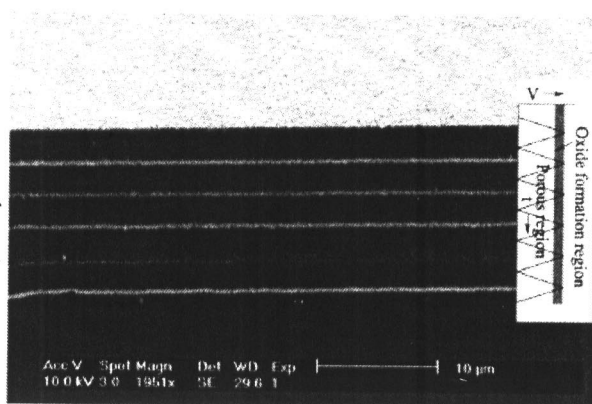


Fig. 2 Gallium phosphide multilayer

1. L. K. van Vugt, A. F. van Driel, R. W. Tjerkstra, L. Bechger, W. L. Vos, D. Vanmaekelbergh, and J. J. Kelly, *Chem. Commun.* (2002) 2054.
2. J. Wijnhoven, S. J. M. Zevenhuizen, M. A. Hendriks, D. Vanmaekelbergh, J. J. Kelly, and W. L. Vos, *Adv. Mater.* 12 (2000) 888.
3. R. W. Tjerkstra, J. G. Rivas, D. Vanmaekelbergh, and J. J. Kelly, *Electrochem. Solid State Lett.* 5 (2002) G32.