relation to the material microstructure. Further work in the field is clearly needed to extend our knowledge of the porous structure.

Although there is no general agreement about the physical origin of porous silicon luminescence, an increasing number of researchers refer to the quantum confinement effect to analyze their results. Invited speaker M. Lannoo showed that calculations based on the quantum confinement concept can account for several aspects of the light emission, providing a coherent picture of porous silicon luminescence. Other presenters, however, said that the emission cannot be explained by confinement effects. Their view is based on new experiments on the photoluminescence of porous films under high pressure, in a range covering the semiconductor and metallic phases of silicon, that seem to show that the luminescence is not related to any of these phases.

Further work was presented on electroluminescence using liquid contacts. Although this luminescence cannot be used for fabricating devices, studying its characteristics can be useful for extending our knowledge of the charge exchange mechanisms that govern it. For example, the efficient and wavelength-tunable emission obtained with n-type porous layers can be explained by the selective injection of charge carriers into crystallites of different sizes, according to the applied polarization. Studies on solid-state electroluminescence concentrate on the possibility of improving the emission efficiency, which is still too small to allow porous silicon to compete with other light-emitting devices. Two approaches which seem promising were presented: (1) Improve the contact with the porous layer by filling the pores with a conductive material, which may be either a polymer or a metal, and (2) Achieve efficient injecting junctions by forming porous p-n junctions. Further improvements in emission efficiency are still required, however, before industrial applications can be considered. An invited talk by P. Steiner on micromachining applications of porous silicon indicated that this is a field in which porous silicon appears mature for industry. Steiner showed that porous silicon can be used to produce elaborate silicon microstructures, which can be used in microsensor fabrication.

The symposium confirmed that, in spite of important progress made since the first paper on the topic by L.T. Canham, there is still much to understand about porous silicon. The intense research activity devoted to this material seems likely to continue, driven by unanswered fundamental questions, as well as by the still promising electrooptical applications.

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# 1995 Science For Art Prize

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