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Resum de la tesi (màxim 4000 caràcters. Si se supera aquest límit, el resum es tallarà automàticament al caràcter 4000)

All bodies radiate light spontaneously when heated. The spectrum of radiation is a function of temperature and the material but most materials radiate, in general, in a broad spectral range. Some material, however, can concentrate thermal radiation in a much narrow spectral band. Those materials are termed selective emitters and have a profound impact on efficiency in, for instance, lighting or thermophotovoltaic energy conversion.

Selective emitters are expected to operate at high temperatures and to emit light in a very concise frequency range. One of the most promising methods to control and engineer thermal radiation is the use of photonic crystals. Photonic crystals are artificial periodic structures that can control and confine light in unprecedented ways. However, producing such structures in large areas, and able to withstand high temperatures, still is a challenging task.

This thesis is devoted to the study of the thermal emission properties of 3D macroporous silicon structures in the mid-IR (2-30 μ m). In particular, this work focuses on reducing the otherwise high emissivity of silicon. Samples studied in this work have a pitch of 4 μ m, limiting results to the MIR region, although much smaller sizes are technologically achievable. We have demonstrated that 3D macroporous silicon can inhibit thermal radiation from the top surface of the samples. Further, this band could be tuned in a broad range just
with small changes during the macropores formation. We also demonstrated that width and frequency position of this band could be doubled by applying post-processing techniques to the initial samples. Finally, we have shown that arbitrarily large bands with low emissivity can be produced by aperiodic macroporous structures with the lattice constant chirped along the pore axis.

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