SELF-REPORTING POROUS SILICON BASED MICRO-RIBBONS FOR MONITORING DRUG DELIVERY

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The noticeable properties of porous silicon (pSi), such as biocompatibility, biodegradability, high surface area, modulability of its optical and morphological properties, as well as the accessibility of the surface for post-processing chemical modifications and functionalization, make it an ideal material for developing drug delivery systems [1]. Micro and nanoparticles from pSi have been extensively studied for this purpose, and also demonstrated their capability to be loaded with several molecular species and drugs [2-3]. In this work, we present the formation of luminescent porous silicon micro-ribbons (LpSiMRs) based on self-assembly of pSi nanoparticles. The formation of self-assembled structures is driven by competitive forces, such as van der Walls interactions, hydrogen bonds and electrostatic interactions [4], thus, a directional evaporative process, highly dependent to geometric-related stress, allows the close packing of the particles as the solvent evaporates and volume recedes. By controlling nanoparticles concentration, temperature during the evaporation process and solvent, we were able to synthetize rectangular well-shaped pSiMRs with dimensions of ? 100 x 25 x 8000 µm. As the porous structure is conserved all along the process, molecular loading remains possible. On the other hand, as the characteristics of the luminescence evolve together with the degradation of the PSi matrix (changes in maximum emission wavelength and in lifetime), the evolution of the pSi state can be monitored in real time. These features open the possibility to use LpSiMRs as self-reporting implantable devices for drug delivery.

**Keywords:** porous silicon, micro-ribbons, self-assembly

**References:**


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