Nanomanufacturing for Sensing Systems by Soft Nanolithography Method

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Poster

Short Description: **The silicon nanospikes, with a diameter of 50～150 nm, can be formed with the femtosecond laser irradiations. Such nanospiked structures have high area-to-volume ratio and small size, which is applicable for the sensing systems with high sensitivity. The soft nanolithography, based on the replica molding in polymers from the masters, is an important technique for nanoscience and technology with very low cost. In this work, by combining the femtosecond laser irradiation with the soft nanolithography technology, we have successfully replicated the silicon nanospike structures with polymer, and fabricated the surface-enhanced Raman scattering and room temperature SnO_2 thin film CO gas sensing systems on the polymer nanospike substrates.**

Keywords: nanospike; soft nanolithography; sensing; surface enhanced Raman scattering; CO gas; tin oxide

Abstract:
The nanospike structures formed with femtosecond laser irradiations have been successfully replicated on the surface of a polyurethane (PU) polymer using a low cost soft nanolithography method. The surface enhanced Raman scattering (SERS) of rhodamine 6G (Rh6G) and dinitrotoluene (DNT) molecules have been measured with silver coated PU nanospiked surfaces. The SnO_2 thin film CO gas sensors on PU nanospikes have also been fabricated and measured at room temperature. Compared to a flat surface, all the sensing signals are significantly enhanced because of the high area/volume ratio and small size of the PU nanospikes. It demonstrates that the highly sensitive, repeatable and low-cost sensing systems can be easily fabricated by using the nanospike structures formed by femtosecond laser irradiation and the soft nanolithography.

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