Designing of micro patterning stamp with PDMS and its selective dye attraction

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The designing of micro patterning of photochromic compound is considerable interests due to their potential technological applications in the fields of data recording, optical switching and non-linear optics[1]. Commonly, patterning of photochromic compound is readily achieved to the substrate surfaces by hydrophobic interaction. In this context, light stamping lithography (LSL) method was used to provide a photosensitive spiroxazine dye pattern and spiroxazine dye compound was synthesized. We researched potential of photosensitive spiroxazine dye pattern with poly(dimethylsiloxane) (PDMS)[2] by hydrophobic interaction.

Spiroxazine dye was prepared form 1,3,3-trimethyl-2-methylene-indoline and 1-nitroso-2,7-dihydroxy-naphthalene according to the described method[3,4]. Yield: 55%, Calculated for $C_{22}H_{20}N_2O_2$: C, 76.72; H, 5.85; N, 8.13. Found: C, 75.63; H, 5.67; N, 8.01. The spiroxazine pattern was fabricated using light stamping lithography (LSL) method. At first, the surface of the substrate was then sequentially ultrasonicated in a acetone, ethanol and distilled water, followed by sonication for 5min, respectively. And PDMS stamp was fabricated by soft-lithography. In this process, to the formation chemical bond between substrate surface and PDMS stamp, UV was exposed using Uvitec (CL508S, UK) for 5 min. Secondly, the PDMS stamp is physically peel off from the substrate, washed by distilled water. Finally, the spiroxazine was deposited on remained PDMS stamp of substrate surface by hydrophobic interaction.

In conclusion, photosensitive spiroxazine dye was synthesized by according the method described in Refs[3,4] and demonstrated by elemental analyses. When UV irradiated to the spiroxazine pattern, the photochromic reaction is caused by the reversible heterolytic cleavage of the C(spiro) - O bond under UV irradiation, yielding the colored form that can return to the coloress form by ring closure under visible light irradiation or in the dark. This method is convenient and rapid. The spiroxazine pattern was well prepared on the patterned PDMS surface. From the result, it can be proposed that the spiroxazine pattern was selectively deposited on the

patterned PDMS surface by hydrophobic interaction. It could be applied to the fabrication of biological and chemical sensors.

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