課題番号　　:F-15-HK-0045
利用形態　　:共同研究
利用課題名(日本語)　　:
Program Title (English)　　:Surface sensitivity studies and applications of label-free nanostructure-based biochips
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1. 概要(Summary)

Surface plasmon resonance sensing is a real-time and label-free detection technique which has been employed in applications including medical diagnostics, environmental monitoring and food safety. Increasing the figure of merit value (FoM=surface wavelength sensitivity/resonant bandwidth) of a plasmonic sensor is an important issue, which can provide a better sensing ability. In this project, we propose a nanostructure of capped metallic nanoslits to fulfill the mentioned requirement. The metallic nanostructures are made on a polymer substrate using hot embossing nanoimprinting lithography. We utilized the ultrahigh resolution electron-beam (EB) writer system to draw polymer resist nanostructures and then completed a mold for hot embossing nanoimprinting lithography. The low-cost high-sensitive large-area plasmonic biochips with sharp resonances were fabricated.

2. 実験(Experimental)

・Apparatus

EB writer system (Elionix, ELS-F125-U)

・Method

Polymer resist nanogrooves on a silicon substrate were fabricated using EB lithography. A 100-nm-thick polymer resist was spin-coated on a 525-μm-thick silicon substrate. An EB writer system was used to draw nanogroove arrays with various periods, from 470 to 520 nm, and various groove widths, from 60 nm to 90 nm. Figure 1 shows the fabricated nanogroove arrays on a silicon substrate. The period was 500 nm and the area of each array was 5×5 mm^2.

Figure 1.

3. 結果と考察(Results and Discussion)

The polymer resist nanostructures were utilized to fabricate a mold for hot embossing nanoimprinting lithography. After depositing a metal film on the imprinted plastic substrate, the biochip was made. Figure 2 shows the low-cost high-sensitive large-area plasmonic biochips with sharp resonances. The capped silver nanoslit arrays were made on an A4 size plastic film. Such inexpensive and reproducible large-area capped nanoslit array chips can benefit sensing applications.

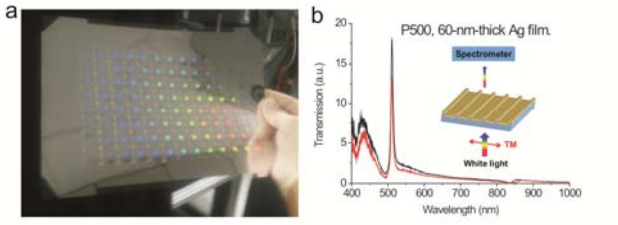

Figure 2.

4. その他・特記事項(Others)

Collaborator: (RIES, Hokkaido Univ.)Jie Li,, Xu Shi, Quan Sun, Kosei Ueno, Hiroaki Misawa

5. 論文・学会発表(Publication/Presentation)

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