Electronic Supplementary Information

Fabrication and optical sensing properties of mesoporous silica nanorod array

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Estimation of the porosity of mesoporous silica

To estimate the porosity of mesoporous silica (MS) in this study, three mesoporous silica films on Au films with different thickness were fabricated via the Stober-solution growth method. In Kretschmann configuration, the mesoporous silica film (MSF) with the Au film also exhibits typical optical waveguiding (OWG) characteristics. The thickness of the MSF used for detection in Fig S1 (a), (b) and (c) is 530, 720, and 880 nm respectively. In the Fresnel calculations, the four phase structure is adopted. It consists of a glass substrate, Au layer, the MSF, and the sample solution. The parameters used in the Fresnel calculations are consistent with the one referred in the article. We can see that the Fresnel calculations when the effective RI of the MS (n_{ms}) in the calculations is set to be 1.395 fit well with the experiment results of water based on the four phase structure. The volume fraction of silica in the MSF (f_{silica}) can be calculated to be 50.34% according to Bruggeman approximation:

$$f_{silica}\frac{n_{silica}^2-n_{ms}^2}{n_{silica}^2+2n_{ms}^2}+(1-f_{silica})\frac{n_m^2-n_{ms}^2}{n_m^2+2n_{ms}^2}=0$$

where n_{silica} and n_m are the RI of solid silica (n_{silica} = 1.457) and the surrounding medium (n_m = 1.333 for water) , respectively. Therefore, the porosity of mesoporous silica is estimated to be 49.66%.

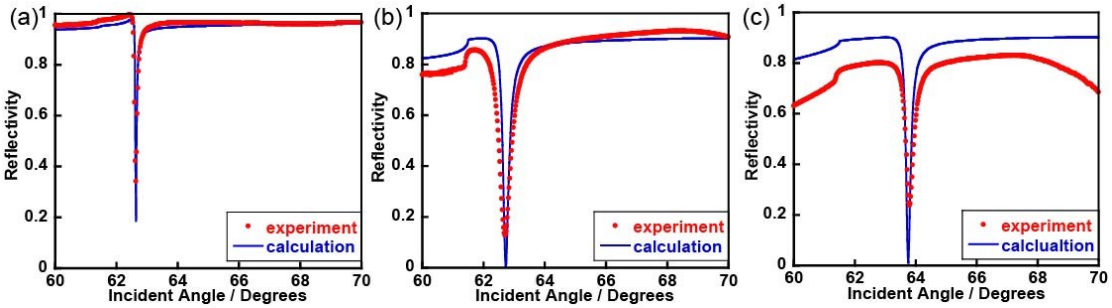

Fig S1. Angular reflectivity spectra measured with water using OWG sensor under (a) s-polarized, (b) p-polarized and (c) p-polarized.