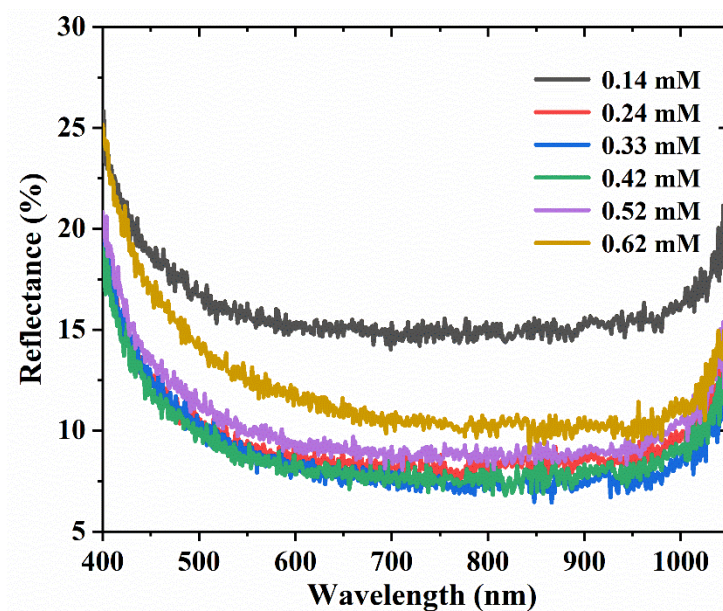
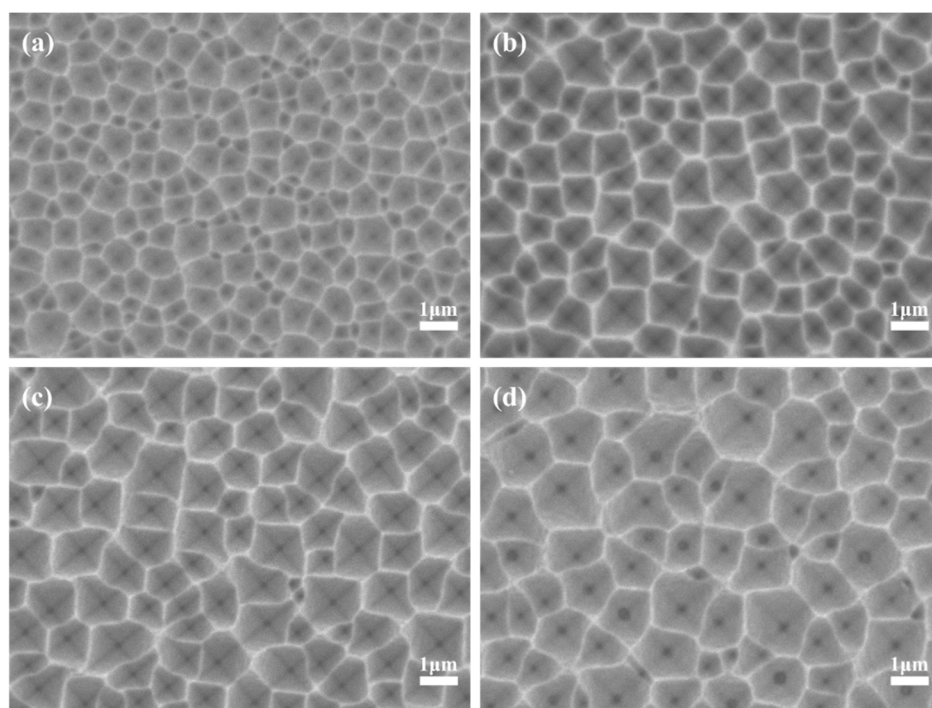


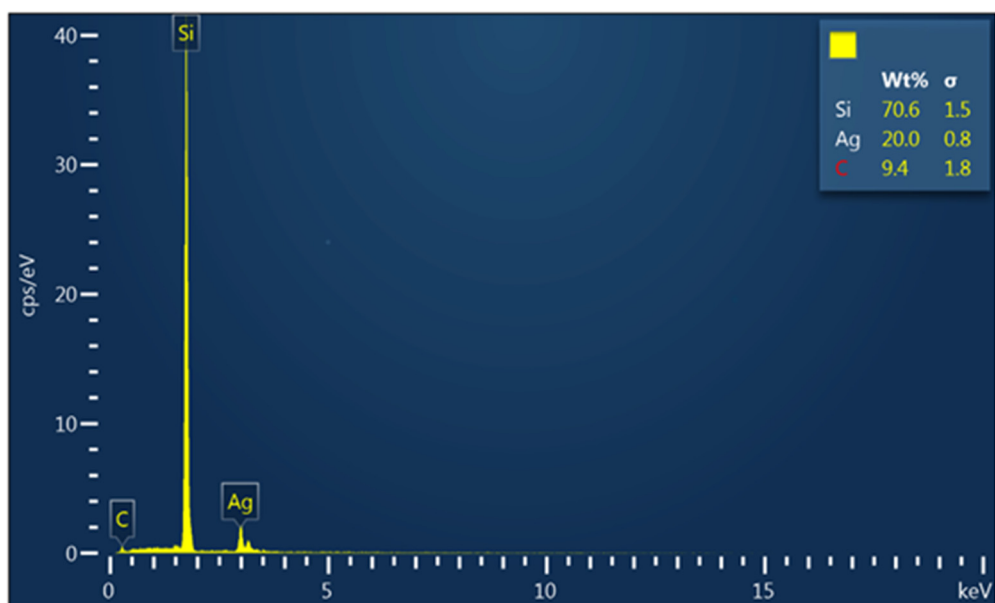
**Figure S1.** Reflectance spectra of silicon wafers etched in different  $\text{NH}_4\text{HF}_2$  solution for 7 min.



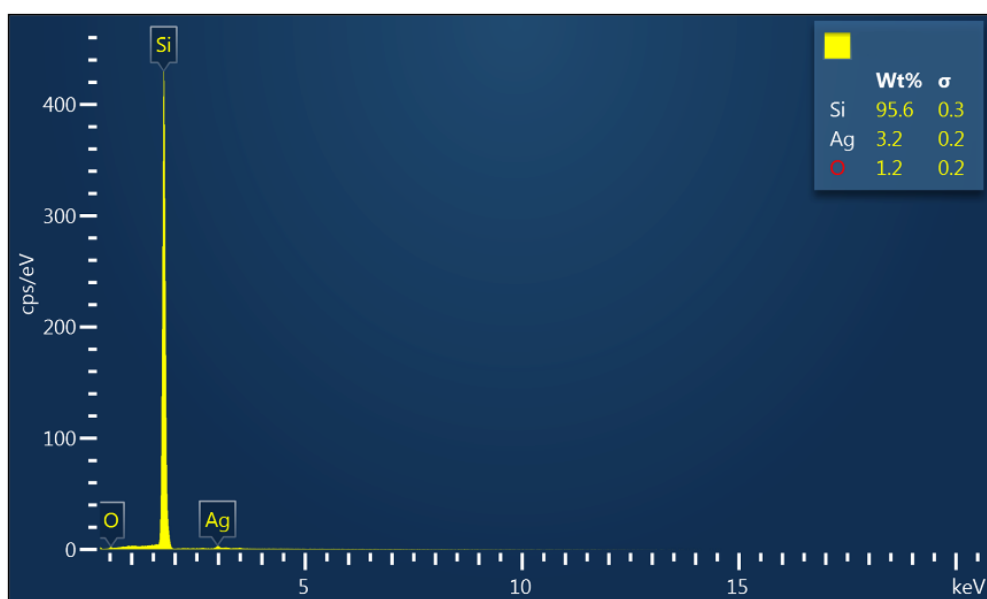
**Figure S2.** Reflectance spectra of silicon wafers etched in different  $\text{AgNO}_3$  solution for 7 min.



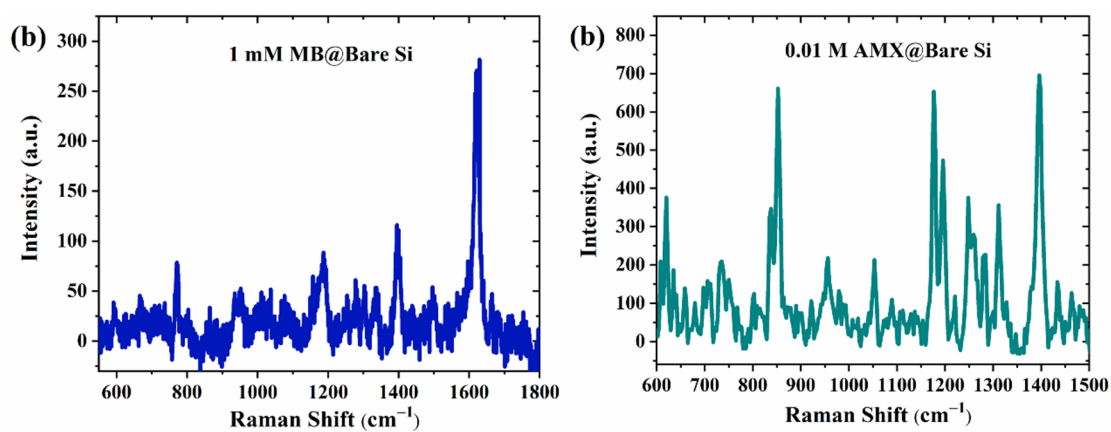
**Figure S3.** SEM images of silicon surface etched for different times (a) 3min; (b) 7min; (c) 11min; (d) 15min.



**Figure S4.** EDS spectrum of the substrate deposited with 240 s of Ag NPs



**Figure S5.** EDS spectrum of the substrate sputtered with 30 s of Ag NPs



**Figure S6.** Real time Raman Spectra of MB (1 mM) and MP (0.01 M) were collected from Bare Si

**Table S1.** Assignment of vibration modes corresponding to each Raman peak for probe molecules methylene blue

Raman peak ( $\text{cm}^{-1}$ )	Band assignment
595	Skeletal deformation of C-S-C
674	Out-of-plane bending of C-H
770, 951, 1039	In-plane bending of C-H
1181,	Stretching of C-N
1301	In-plane ring deformation of C-H
1394	Symmetrical stretching of C-N
1622	Ring stretching of C-C

**Table S2.** Assignment of vibration modes corresponding to each Raman peak for probe molecules amoxicillin

Raman peak ( $\text{cm}^{-1}$ )	Band assignment
616	Bending of -OH
667	Ring deformation of benzene
791	In-plane deformation
937	Amine bending
1158	Benzene ring's C-H bending
1293	Benzene's in-plane deformation
1351	Amine's twisting
1461	Asymmetric bending of $\text{CH}_3$