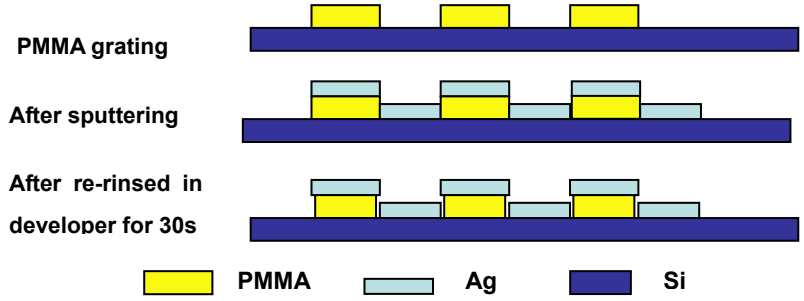
Supplementary Information

Coupled Subwavelength Gratings for Surface-Enhanced Raman Spectroscopy

Yumin Hou,*[a] Jun Xu,[a] Wuxia Li[b] and Xiaowei Wang[a]

(1) Explanation of sample preparation:

PMMA is chosen as the separation layer between the top and bottom Ag gratings for the convenience of EBL. To eliminate the spectrum of PMMA, we try to remove the PMMA close to the edges of Ag gratings. As we know, PMMA developer [1:3 MIBK (methyl isobutyl ketone) to IPA (iso-Propyl alcohol)] can only remove the E-beam exposed PMMA. When we expose a grating pattern of PMMA by E-beam, we also expose the PMMA close to the grating pattern. We can control the width of the grating by changing the developing time. That is the same reason why we can remove the PMMA close to the Ag grating's edge by the PMMA developer after the Ag film deposition. The following is a chart to show which part of PMMA is removed. After part of PMMA near the Ag grating's edge is removed, fluorescence emission of R6G molecules deposited on PMMA is suppressed while fluorescence emission of R6G on Ag grating is quenched by rapid energy transfer from the excited electronic state to the metal surface [11]. So this process not only can clear up the spectrum signal of PMMA but also can depress the fluorescence emission of R6G.



(2) **Videos for the simulations in figure 6-8** (The legend is different for different gaps.).