

Supporting Information

Localized Surface Plasmon Resonance Coupling in Au Nanoparticles/Phosphorus Dendrimer Multilayer Thin Films Fabricated by Layer-by-Layer Self-assembly Method

Wen Bo Zhao,^a Jeongju Park,^b Anne-Marie Caminade,^c Seong-Jun Jeong,^d
Yoon Hee Jang,^a Sang Ouk Kim,^d Jean-Pierre Majoral,^c Jinhan Cho^{b*}
and Dong Ha Kim^{a*}

^a Department of Chemistry and Nano Science, Ewha Womans University, 11-1 Daehyun-Dong, Seodaemun-Gu, Seoul 120-750, Korea. Fax: +82-2-3277-4517; Tel: +82-2-3277-3419; E-mail: dhkim@ewha.ac.kr

^b School of Advanced Materials Engineering, Kookmin University, Chungneung-Dong, Songbuk-Gu, Seoul 136-702, Korea. Fax: +82-2-910-4320; Tel: +82-2-910-4287; E-mail: jinhan@kookmin.ac.kr

^c Laboratoire de Chimie de Coordination, CNRS UPR 8241, 205 Route de Narbonne, 31077 Toulouse Cedex 04, France.

^d Department of Materials Science and Engineering, KAIST Institute for the Nanocentury, KAIST, Daejeon 305-701, Korea

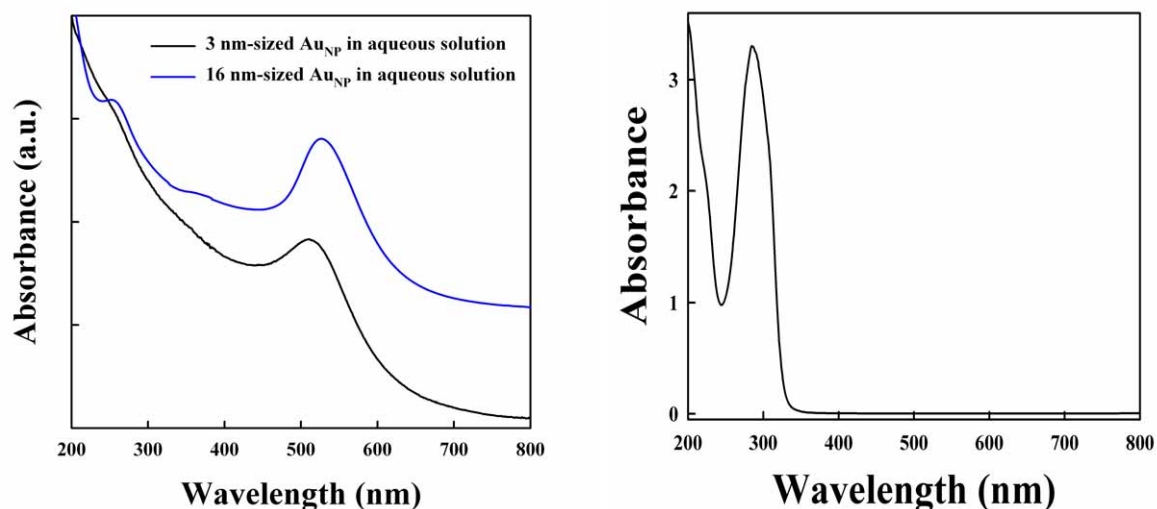


Figure S1. UV-vis absorption spectra of AuNPs (left) and dendrimer (right) in aqueous solution

5 bilayers

10 bilayers

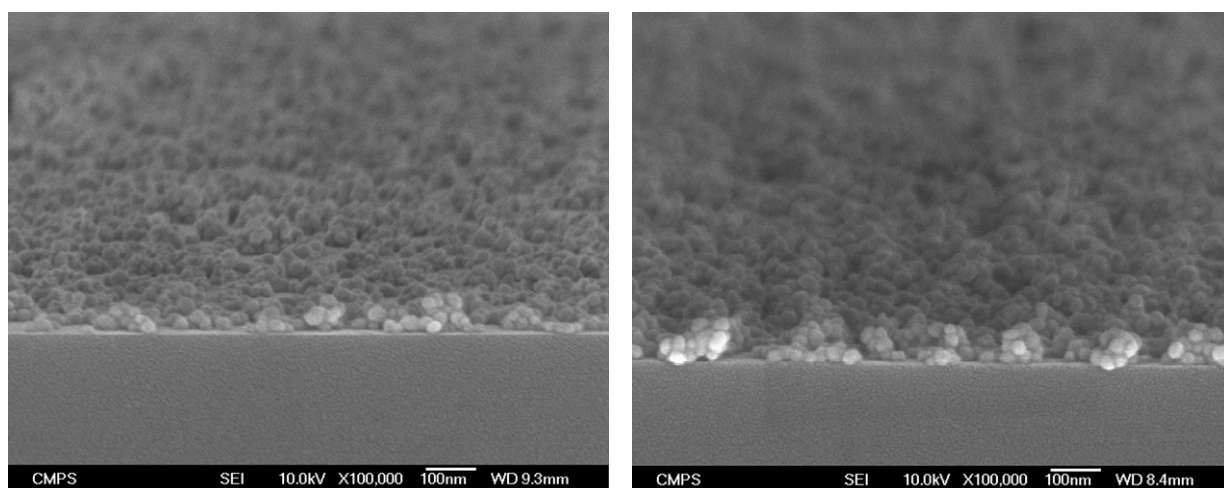


Figure S2. FESEM images of $[\text{Au}_{\text{NP}}/\text{G}_4(\text{NH}^+\text{Et}_2\text{Cl}^-)_{96}]_5$ (left) and $[\text{Au}_{\text{NP}}/\text{G}_4(\text{NH}^+\text{Et}_2\text{Cl}^-)_{96}]_{10}$ (right) multilayer films

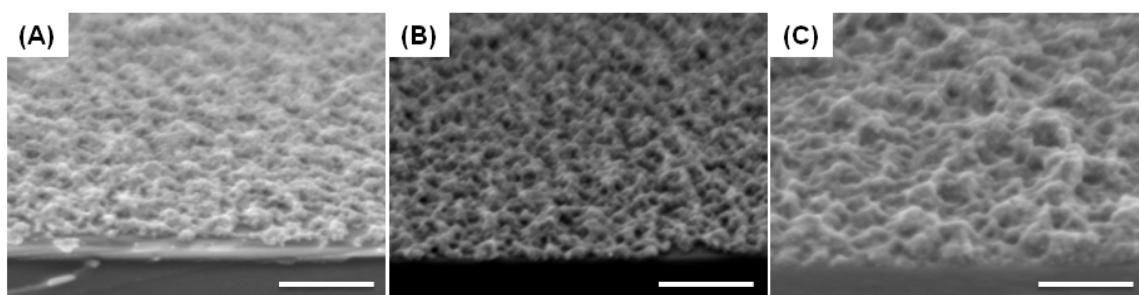


Figure S3. FESEM images of $[\text{Au}_{\text{NP}}/\text{G}_4(\text{NH}^+\text{Et}_2\text{Cl}^-)_{96}]_{10}$ multilayer films containing **3 nm**-size Au_{NP} : (a) as prepared film; (b) an identical film in Fig.S1a after removal of dendrimers by UV exposure; (c) an identical film in Fig.S1a with 0.5 mol NaCl (The scale bar represents 200 nm in length.)

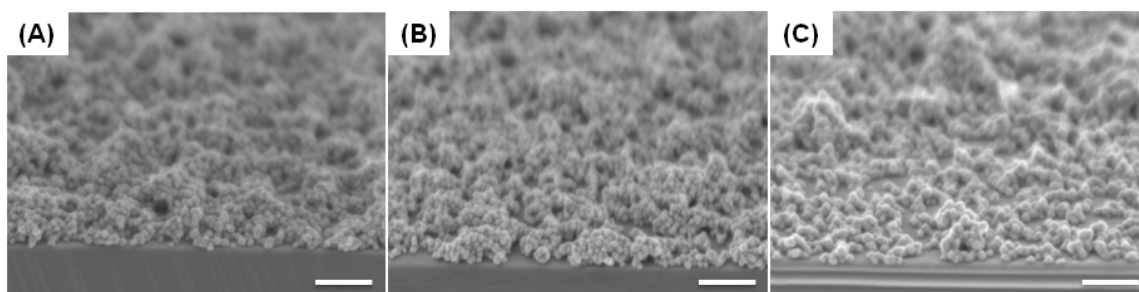


Figure S4. FESEM images of $[\text{Au}_{\text{NP}}/\text{G}_4(\text{NH}^+\text{Et}_2\text{Cl}^-)_{96}]_{10}$ multilayer films containing **16 nm**-size Au_{NP} : (a) as prepared film; (b) an identical film in Fig.S1a after removal of dendrimers by UV exposure; (c) an identical film in Fig.S1a with 0.5 mol NaCl (The scale bar represents 200 nm in length.)

As shown in Fig. S3(b) and S4(b), the multilayer films after the removal of dendrimers by UV light exposure exhibit highly porous, collapsed structures. In comparison, the films prepared from salt-containing dendrimer solutions (Fig. S3(c) and S4(c)) are highly swollen and an increase in the average distance between neighboring Au_{NP} is clearly observed.

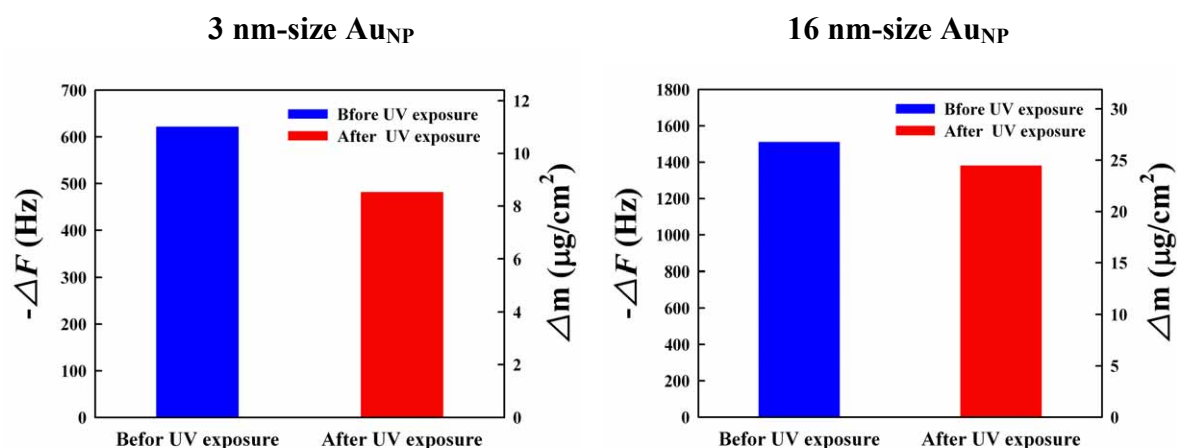


Figure S5. Comparison of the frequency (or mass) change for the assembly of $[\text{Au}_{\text{NP}}/\text{G}_4(\text{NH}^+\text{Et}_2\text{Cl}^-)_{96}]_5$ multilayer films before and after UV light irradiation on a QCM electrode. The diameter size of Au_{NPs} was about 3 nm (left) and 16 nm (right), respectively.