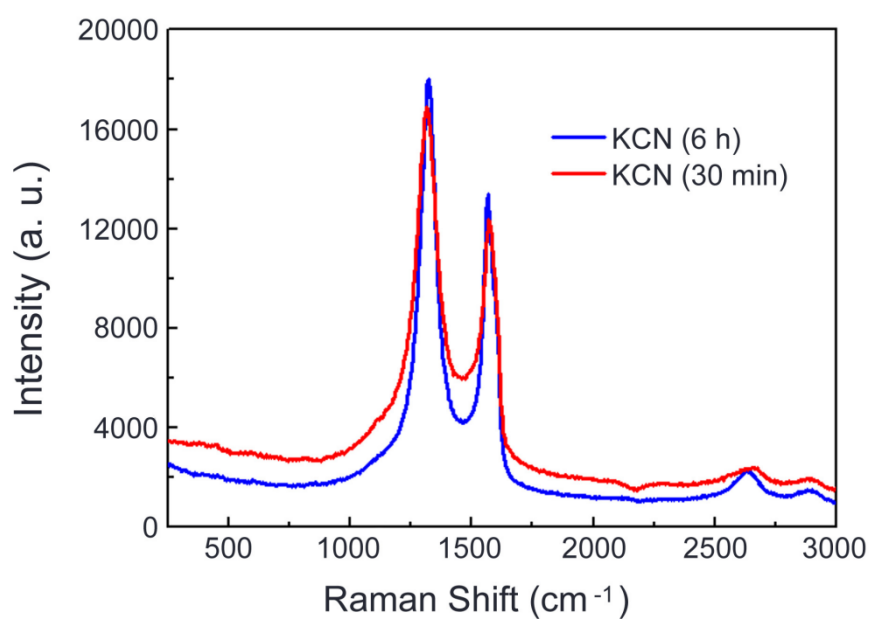


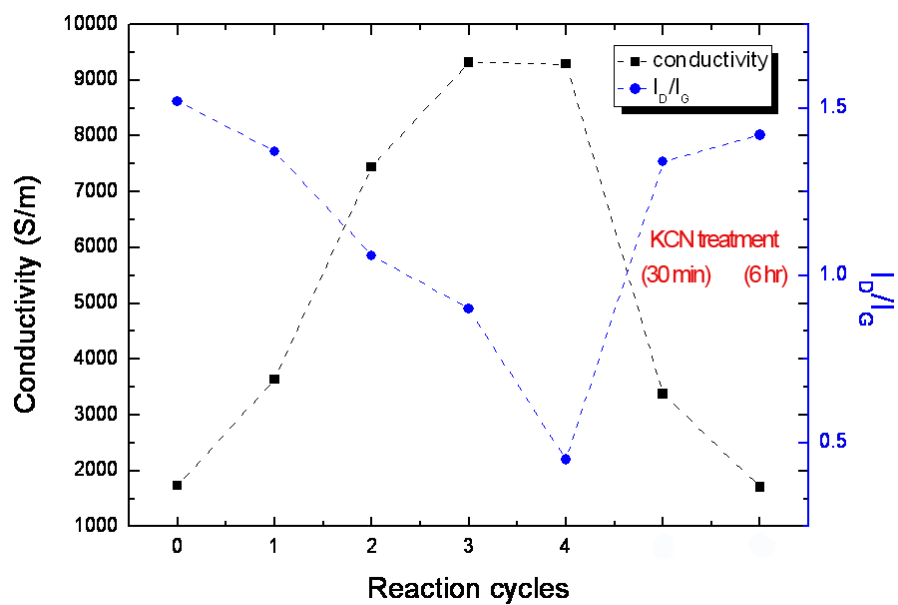
# Supplementary Information

## **Gold Nanoparticle-doped Graphene Nanosheets: Sub-nanosized Gold Clusters Nucleate and Grow at the Nitrogen-induced Defects on Graphene Surfaces**

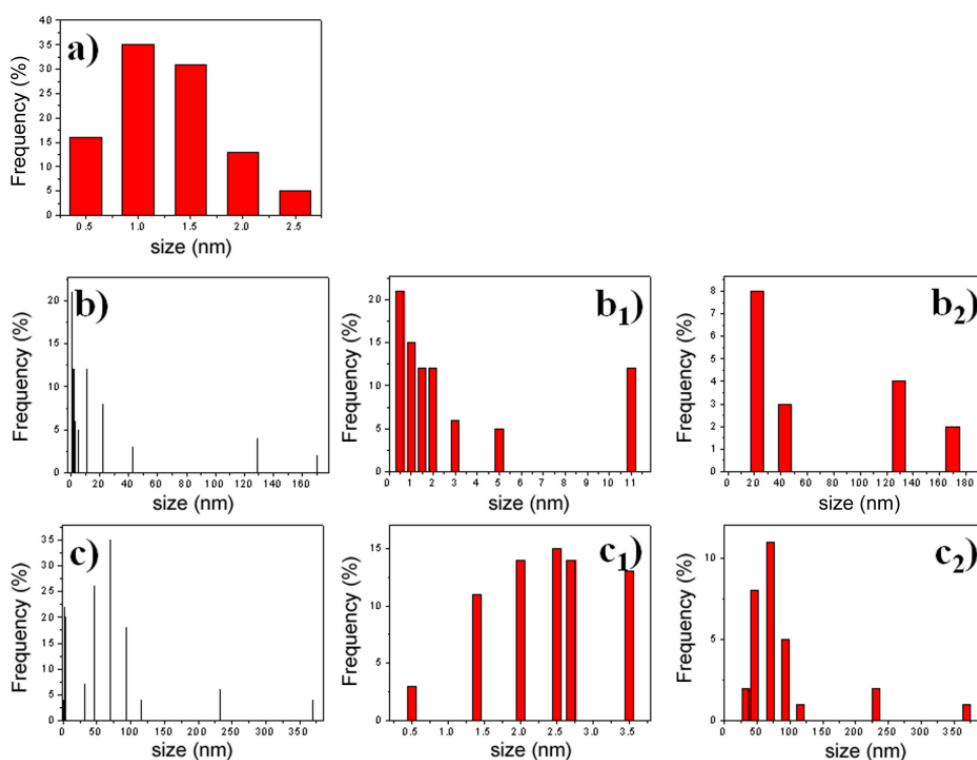
Hye Young Koo,<sup>a</sup> Ha-Jin Lee<sup>b</sup>, Yong-Young Noh,<sup>c</sup> Eui-Sup Lee,<sup>d</sup> Yong-Hyun Kim,<sup>d</sup> and Won San Choi<sup>\*c</sup>



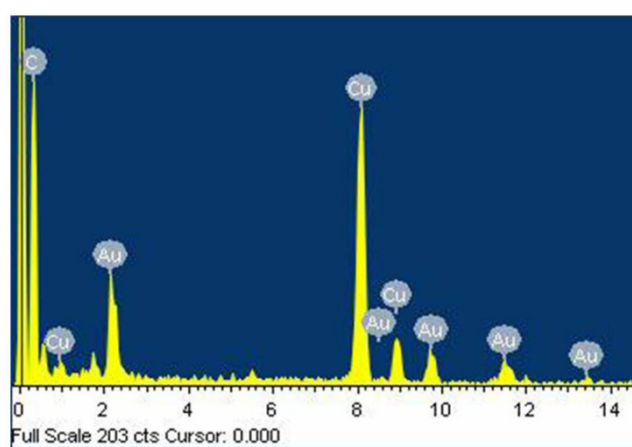
**Fig. S1** Raman spectra of the 4-Au/r-GOs as a function of time of KCN treatment. The ratio ( $I_D/I_G$ ) of the 4-Au/r-GOs was restored to its original value by the KCN treatment.



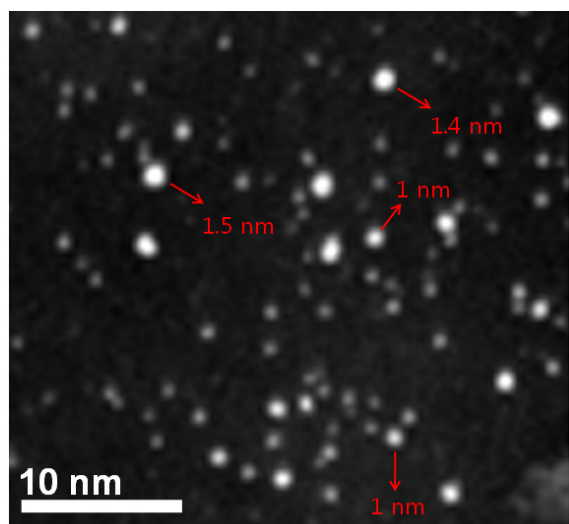
**Fig. S2** Change in the conductivities and the  $I_D/I_G$  of the Au/r-GOs as a function of the number of AuNP growth cycles and KCN treatment time.



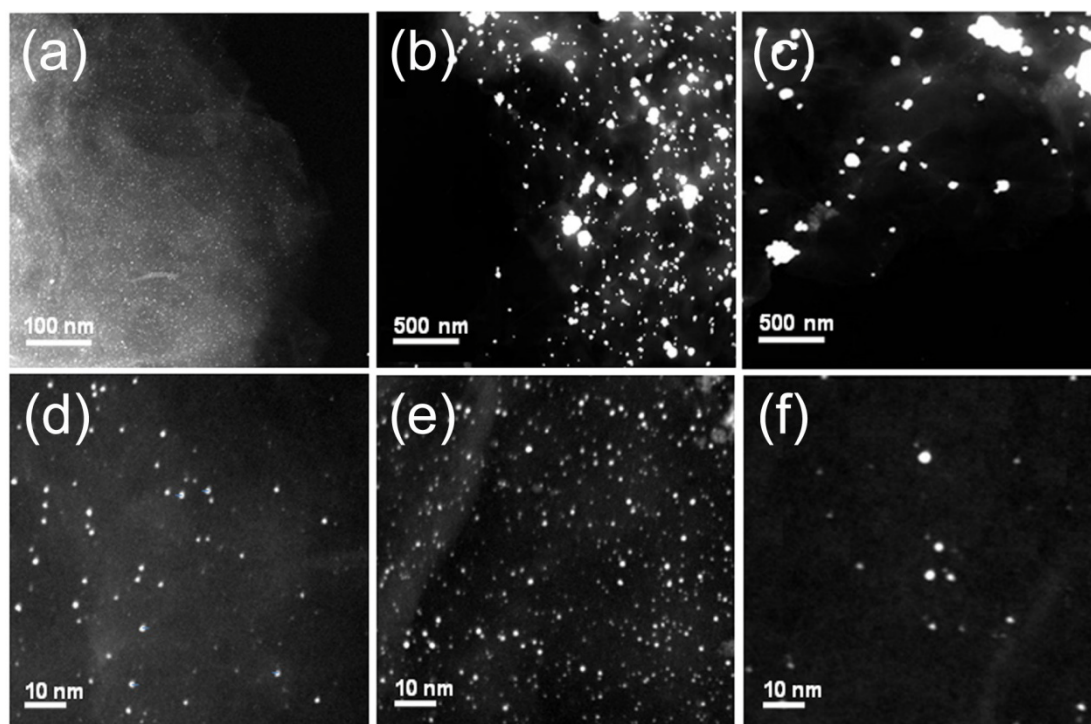
**Fig. S3** Average particle sizes of (a) Au on r-GOs (1 cycle), (b) Au on r-GOs (4 cycles), and (c) Au on r-GOs (4 cycles) after KCN treatment (30 min). After 4 reaction cycles, the population of Au sub-NPs below 0.5 nm in size was remarkably increased, compared to that of 1 reaction cycle. After KCN treatment, however, the population of Au sub-NPs was dramatically decreased even though Au particles ranging in size from several nanometers to several submicrometers were still observed. [ b = b<sub>1</sub> + b<sub>2</sub>, c = c<sub>1</sub> + c<sub>2</sub> ]



**Fig. S4** EDX data of 1-Au/r-GOs confirming the synthesis of AuNPs on the r-GOs. The Cu peaks came from copper grid.



**Fig. S5** Magnified HAADF-STEM image of 4-Au/r-GOs. The population of Au sub-NPs below 0.5 nm was remarkably increased compared to that of 1-Au/r-GOs.



**Fig. S6** The comparative HAADF-STEM images of (a) 1-Au/r-GOs, (b) 4-Au/r-GOs, and (c) 4-Au/r-GOs after KCN treatment (30 min) and the magnified images of (d) 1-Au/r-GOs, (e) 4-Au/r-GOs, and (f) 4-Au/r-GOs after KCN treatment (30 min).