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# Virus-metal nano-composites prepared by electrodeposition

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A virus-incorporated bio-template on electrode surfaces and its use in electrochemical nucleation of metal nanocomposite as an electrocatalytic material for energy application is presented. The bio-template developed with M13 virus (M13)-incorporated in silica as a scaffold to nucleate Au–Pt alloy nanostructures by electrodeposition together with reduced Graphene Oxide (rGO). The engineered phage with Y3E peptides could specifically nucleate Au–Pt alloy nanostructures, which ensures adequate packing density, simultaneous stabilization of rGO, and significantly increased electrochemically active surface area. The electrocatalytic activity of the resulting sol-gel composite catalyst toward methanol oxidation in alkaline medium was investigated and found enhanced mass activity relative to wild-type M13 applied bio-template, mono-metallic Pt and other controlled Au–Pt nanostructures with different composition and support. M13 in the nanocomposite materials provides a close contact between Au–Pt alloy nanostructures and rGO. In addition, it facilitates the OH–rich environment to the catalyst. As a result, efficient electron transfer and synergistic catalytic effect of Au–Pt alloy nanostructures toward methanol oxidation were observed. Our nanocomposite synthesis on the novel bio-template and its application might be useful to develop novel clean and green energy generating and storage materials.

## Biography

Kyuwon Kim is currently a Professor and a Director of ELSE Lab of INU. He has completed his PhD from KAIST, Korea in 2002. He joined INU in 2006. He has published more than 60 papers in electrochemistry journal. Dr. Manivannan has completed his PhD from Madurai Kamaraj University in India and is now postdoctor at ELSE Lab of Incheon National University (INU). He has published more than 15 journal papers in electrochemistry.

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