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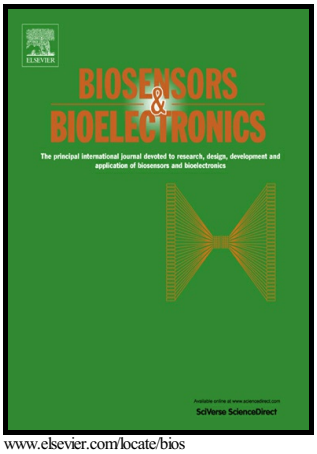


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# Gold Dendrites Co-deposited with M13 Virus as a Biosensor Platform for Nitrite Ions

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**Abstract:**

We developed a biosensor for nitrite ion on an electrode surface modified with M13 viruses and gold nanostructures. Gold dendritic nanostructures (Au-DNs) are electrochemically co-deposited from 4E peptides engineered M13 virus ($M13_{4E}$) mixed electrolyte on to the ITO electrode. The $M13_{4E}$ could specifically nucleate Au precursor (Gold (III) chloride), which enable the efficient growth of dendritic nanostructures, whereas such dendritic structures were not obtained in the presence of wild-type and Y3E peptides engineered M13 viruses. The structural features of the Au-DNs and their interfacing mechanism with ITO electrode are characterized by SEM, EDX and XRD analyses. The growth of Au-DNs at ITO electrode has been monitored by time dependent SEM study. The $M13_{4E}$ induces the formation and plays a crucial role in shaping the dendritic morphology for Au. Biosensor electrode was constructed using Au-DNs modified electrode for nitrite ions and found improved sensitivity relative to the sensor electrode prepared from wild-type M13, Y3E peptides engineered M13 and without M13. Sensor electrode exhibited good selectivity toward target analyte from the possible interferences. Furthermore, 4E native peptides were used as additive to deposit Au nanostructures and it is compared with the structure and reactivity of the Au nanostructures prepared in the presence of $M13_{4E}$. Our novel biosensor fabrication can be extended to other metal and metal oxide nanostructures and its application might be useful to develop novel biosensor electrode for variety of biomolecules.

**Keywords**: Biosensor, Electrodeposition, Gold nanostructures, M13 virus, Nitrite ions