

Pt-Au-Ag alloy nanodendrite forest synthesized by co-deposition of Pt and Au on Ag nanodendrite and its usage for electro-catalyst

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The metallic alloy nanostructure has been extensively applied for various catalytic reactions. Among them, Pt-based nanostructure is considered as a wonder material for catalytic oxidation or reduction reaction. However, due to its high cost, the use of metallic alloy is quite limited. In this study, a novel metallic alloy nanodendrite of Pt-Au-Ag was introduced as a promising material with high electro-catalytic activity. First, a forest of Ag nanodendrite with ultra high surface area was synthesized by using an electrodeposition method in presence of citric acid. Then Au and Pt were co-deposited through a galvanic displacement reaction of such metal salts on the Ag nanodendrite. Polyvinylpyrrolidone (PVP) was used as a catalyst for the galvanic displacement reaction to make a uniform coating of Pt and Au on the Ag nanodendrite. For characterization of the structure, SEM, TEM and XRD were used. In addition, the atomic concentration of Pt, Au and Ag in the alloy were analyzed by using energy-dispersive X-ray (EDX). Finally, the electro-catalytic activity of Ag-Au-Pt alloy was investigated for both methanol oxidation and oxygen reduction reactions.

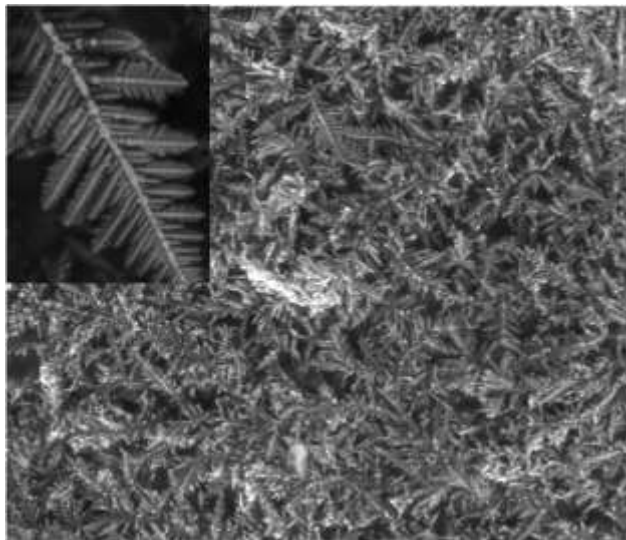


Figure 1: Forest of Ag nanodendrite constructed by electrodeposition on Ti electrode in presence of Citric acid.

References

1. T.N. Huan, T. Ganesh, K.S. Kim, S. Kim, S.H. Han, H. Chung, *Biosensors and Bioelectronics* 2011, 27, 183-186.
2. W. Zhang, J. Yang, X. Lu, *ACS Nano* 2012, 6, 7397-7405.
3. C. Zhu, J. Zeng, J. Tao, M.C. Johnson, I.S. Krey, L. Blubaugh, Y. Zhu, Z. Gu, Y. Xia, *JACS* 2012, 134, 15822-15831.