Formationof Nanocluster by Sputtering with Cluster Source for Fabricating a HierarchicalNanoporous Ag Films

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The purpose of this study is to devise a sputtering system to deposit a nanoporous metal thin film at room temperature by mounting a cluster source on a conventional sputtering system. Then, we analyzed the Raman response characteristics according to the process conditions and examined the applicability to the surface enhanced Raman scattering (SERS) substrate. The Raman intensity increased with increasing thickness and showed a tendency to be saturated approximately 4.3 x 10^4 cps at a thickness of 2 μm. As the process pressure increased, the gap between the metal clusters increased and the porosity also increased to 71 - 82%. When the length of the condensation region was varied between 135 mm and 214 mm, the EF of the Raman had a value between 3.97x10^6 and 4.44x10^6. When the partial pressure ratio of He is 7.5% EF is 4.06x10^6. It increases to 4.4x10^6 when the partial pressure of He is increased to 17.6% However, it decreases when the partial pressure of He increases further. As for pwoer, we observed that EF is 3.54x10^6 when the power is 120W. It increases to 4.44x10^6 when the the power is 140W. However, it decreases when the power is 160W.

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