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Growth Mechanism of Self-Catalytic Ga2O3 Nano-Burr Grown by RF Sputtering

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Gallium Oxide (Ga2O3) has been widely investigated for the optoelectronic applications due to its wide bandgap and the optical transparency. Recently, with the development of fabrication techniques in nanometer scale semiconductor materials, there have been an increasing number of extensive reports on the synthesis and characterization of Ga2O3 nano-structures such as nano-wires, nanobelts, and nano-dots. In contrast to typical vaporliquid-solid growth mode with metal catalysts to synthesis 1-dimensional nano-wires, there are several difficulties in fabricating the nanostructures by using sputtering techniques. This is attributed to the fact that relatively low growth temperatures and higher growth rate compared with chemical vapor deposition method. In this study, Ga2O3 chestnut burr were synthesized by using radio-frequency magnetron sputtering method. In contrast to typical sputtering method with sintered ceramic target, a Ga2O3 powder (99.99% purity) was used as a sputtering target. Several samples were prepared with varying the growth parameters, especially he growth time and the growth temperature to investigate the growth mechanism. Samples were characterized by using XRD, SEM, and PL measurements. In this presentation, the details of fabrication process and physical properties of Ga2O3 nano chestnut burr will be reported.

Keywords: Ga2O3, Nano-burr, RF sputtering, Growth mechanism