

BiI₃ nucleation and coalescence onto amorphous substrates

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BiI₃ was synthesized from Bi₂O₃CO₂.H₂O y KI, and then treated with HI to avoid the formation of BiOI by hydrolysis. The material was purified by zone melting followed by two sublimations. Nucleations were performed by physical vapor deposition (PVD) in 2"x2" glass substrates with an initial pressure of 4×10^{-3} Pa. Source and substrate were electrically heated, with temperatures ranging from 150-180 °C and 50-150 °C for source and substrate respectively, in order to study supersaturation influence in nucleation. The obtained nuclei were between 0.2 to 0.03 μm in size. Annealing was performed seeking for the nuclei coalescence, heating at 80-110 °C during 5 days. Coalescence was only observed when annealing the smallest nuclei (sizes between 0.03 and 0.05 μm). The optical microscopy shows nuclei coalescence giving rounded microcrystals highly oriented, about 100 times longer in size than the original nuclei. Nuclei fusion was found to increase with annealing time and temperature. Films of BiI₃ were grown onto the best nucleation layers. These films were characterized by optical microscopy, scanning electron microscopy (SEM) and atomic force microscopy (AFM). Results are very promising, however microcrystals do not have a preferred orientation as is needed for using them as detectors for digital imaging (final application for which these films are intended to). Future work will be conducted to improve nucleation and coalescence seeking for uniformity as far as the best orientation for the final application.