TIME-EFFECTIVE SYNTHESIS OF RHOMBOHEDRAL $CUALO_2$ FROM MESOPOROUS ALUMINA SUBSTRATE

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The development of p-type transparent semiconductors with large optical bandgaps and high electrical conductivity is needed for a wide range of applications in optoelectronics and solar cell technologies. The experimental techniques currently used are limited to complex procedures and time consuming processing. In this work, we propose a versatile, simple and reproducible method of rapid reactive dip-coating using a mesoporous network of highly aligned γ-alumina nanofibers for synthesis of delafossite $CuAlO_2$ by a time-effective process of 2 hours duration. The rhombohedral $CuAlO_2$ was densified with the help of spark plasma sintering in vacuum. Electrical conductivity improves with increase in annealing temperature while its room temperature value for a sample annealed at 1100°C was 0.07 S m^{-1} measured with four-probe method. Direct optical bandgap of 3.79 eV was estimated with the help of diffuse reflection data for the sample sintered at optimal temperature. Both Seebeck coefficient and Hall measurements confirmed the p-type conductivity of the material.

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