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Title: Manufacturing highly conductive ceramic targets and thin films of ZnO

Abstract
The present investigation addresses a novel approach for sintering ZnO ceramics by means of chemical vapor transport (CVT) using compound transport agents. The typical size of obtained ZnO ceramics was 25 mm in diameter and 1 mm thickness. The sintering ZnO ceramics at the use of $HCl+H_2+C$, is the most perspective and effective method, which has the following advantages: the low sintering temperature of 1070 °C, 99% of the initial diameter, 80% of single crystal hardness, 90-95% of ZnO density, the low resistivity of 0.025 W×cm, free from powder pressing, free from attachment effect and contamination.
ZnO targets with resistivity of 2×10^{-3} W×cm, additionally doped by donor impurities, can be successfully sintered at low temperatures. ZnO thin films (~ 400 nm), obtained by DC magnetron sputtering, have the following parameters: the optical transparency is about 90% in the visible range, resistivity of 4×10^{-4} W×cm, free electron concentration of 3×10^{21} cm^{-3}, and hall mobility of 6 cm^2/Vs. The proposed technology simplifies and reduces the price of manufacturing uniformly doped ZnO ceramic targets, thin films and optoelectronic devices based on ZnO.

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