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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  $\text{HCl}+\text{H}_2+\text{C}$ , 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  $\text{W}\times\text{cm}$ , free from powder pressing, free from attachment effect and contamination.

ZnO targets with resistivity of  $2\times 10^{-3}$   $\text{W}\times\text{cm}$ , 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  $4\times 10^{-4}$   $\text{W}\times\text{cm}$ , free electron concentration of  $3\times 10^{21}$   $\text{cm}^{-3}$ , and hall mobility of 6  $\text{cm}^2/\text{Vs}$ . 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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