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TCO planar sputtering targets manufactured by spark plasma sintering (SPS) technology: Advantages on target microstructure and coating propertiesLucia Mendizabal¹, Josu Goikoetxea¹, Sergio Rivera², Marta Suarez²¹IK4-Tekniker, Eibar, Spain ²Nanoker, Oviedo, Spain

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TCO (both ITO and AZO) planar sputtering targets synthesized by conventional methods (slip-casting and hot pressing) are prone to nodule formation during sputtering process, which induces arcing and lack of reproducibility, sputtering rate decrease and deterioration of ITO and AZO deposited film properties. In this study, spark plasma sintering (SPS) technology was applied for the fabrication of ITO and AZO sputtering targets using high purity complex ITO and AZO powders. SPS technique allows the fabrication of high density targets, avoids the grain growth during sintering and maintains the nanostructure of raw powders at fast production rates. The manufacturing of both small and large size (up to 250 mm in diameter) ceramic targets was carried out to demonstrate the scalability of this synthesis process. During this work, the influence of SPS technology on target microstructure and TCO coating properties was analysed. For that purpose, comparison between commercial targets and SPS manufactured targets was performed. Both ITO and AZO thin films were grown using different targets and optical and electrical properties were compared. Each target microstructure was investigated before and after sputtering process to evaluate nodule and defect formation. Results and conclusions are presented in this work.

Keywords

TCO

Spark Plasma Sintering (SPS)

Microstructure

Optical properties

Electrical properties