Surface passivation of nano-textured fluorescent SiC by atomic layer deposited TiO2

Nanotextured surfaces have played a key role in optoelectronic materials to enhance the light extraction efficiency. In this work, morphology and optical properties of nano-textured SiC covered with atomic layer deposited (ALD) TiO2 were investigated. In order to obtain a high quality surface for TiO2 deposition, a three-step cleaning procedure was introduced after RIE etching. The morphology of anatase TiO2 indicates that the nano-textured substrate has a much higher surface nucleated grain density than a flat substrate at the beginning of the deposition process. The corresponding reflectance increases with TiO2 thickness due to increased surface diffuse reflection. The passivation effect of ALD TiO2 thin film on the nano-textured fluorescent 6H-SiC sample was also investigated and a PL intensity improvement of 8.05% was obtained due to the surface passivation.

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