Abstract

Al doped ZnO (ZAO) films are widely used as transparent contacts of thin film solar cells. Having a reliable and reproducible laser cutting technology is critical for the thin film solar cell device manufacturing. Cutting experiments were carried out in wide range of parameters (1-25 cm/s speed, 1-10 kHz pulse frequency and 200-5800 mW power) but the pulse energy was kept in a narrow range. Optical microscopy of the cuts revealed that there is a critical power for the full ablation of the layer. A parameter range for optimal cutting as a function of the layer thickness is established. Ellipsometry measurements were evaluated by a Cauchy model using a double-layer optical model and resulting in a reliable thickness measurement. Criteria for the transparent conductive character of the layer are also established. These results offer a feasible in-line technique for setting proper cutting parameters of the TCO layer.