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Arc-free reactive pulsed sputtering of Alumina from metalic target in oxide mode

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Alumina coatings are used besides application in cutting tools as insulator for electric and sensor applications. For this application it is most important to produce defect-free films with high field strength. By now many approaches for depositing alumina were tried. The most common way is to use a ceramic target and a rf-Power supply. Since the rf-technology is expensive in the case of upscaling the target size and the deposition rate is low, investigations were carried out using a double magnetron, metallic targets and a feedback control. This approach leads to a high deposition rate, but also to more complex process.
A combination of both processes, sputtering from a metallic target without a feedback control should gain a stable process and also high deposition rate, but was up to now not possible since this process turns instable on industrial sized magnetrons. This presentation shows results of alumina deposited using a Cyprium power supply in oxide mode. The investigations were carried out on a planar target (430mm by 130 mm) and first results are presented. The Current-voltage characteristics for different pulse sequences and charging voltages are shown as well as the hysteresis loop in dependence of the oxygen flow and partial pressure for different average powers. Regarding the insulating properties the films were characterized by their critical leakage field strength.

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