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Arguments for increased efficiency of Xe excimer DBDs by pulsed instead of sinusoidal excitation MARK PARAVIA, KLAUS E. TRAMPERT, MICHAEL MEISSER, WOLFGANG HEERING, Light Technology Institute, University Karlsruhe — Xenon excimer dielectric barrier discharges are used as VUV sources or as plane light sources with phosphor coating. The plasma efficiency of up to 65% [1] depends on the excitation waveform and rises by pulsed operation compared to sinusoidal excitation. However, loss processes and efficiency gain are not completely known. This is caused by the dielectric barrier prohibiting direct measurement of the plasma power. Here internal plasma power measurements, based on an analog method, are presented for sinusoidal and pulsed excitation. The plasma power can be separated into ignition power during ignition phase and glow phase after ignition. It can be shown that ignition power correlates with the VUV radiation. A comparison of ignition power and glow phase power shows that during ignition the generation of exited Xe atoms is very efficient whereas the glow phase is inefficient in production VUV radiation. Time resolved optical measurements of NIR line radiation of excited xenon atoms show that the discharge is supported during glow phase. Comparing sinusoidal and pulsed excitation, the efficiency gain can be explained by reduced glow phase losses. This is shown and explained experimentally using pulse excitation down to a pulse length of a few hundred ns. [1] Vollkommer, F.; Hitzschke L., WO94/23442, 1994

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