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Plasma Diagnostics in Reactive High Power Impulse Magnetron Sputtering System. ZDENEK HUBICKA, JIRI OLEJNICEK, MARTIN CADA, Institute of Physics Czech Academy of Sciences Na Slovance 2 Prague 8, Czech Republic, PETRA KSIROVA, Institute of Physics Czech Academy of Sciences Na Slovance 2 Prague 8, STEPAN KMENT, Palacky University, RCPTM, 17. listopadu 12, 771 46 Olomouc, Czech Republic, DEPARTMENT OF LOW-TEMPERATURE PLASMA TEAM, RCPTM TEAM — Plasma parameters in the reactive pulsed magnetron (R-HIPIMS) were investigated during films deposition. Parameters of Ar+H2S and Ar+O2 pulsed plasma were investigated by the emission spectroscopy, Langmuir probe, RF ion flux and impedance probes. Ionized fraction of sputtered particles and deposition rate were measured by the modified QCM with a magnetic filter and biased electrode. Different modes of reactive deposition process were found and described by physical model. This R-HIPIMS system was used for the deposition of semiconducting oxide and sulphide thin films. These semiconducting films were optimized for applications in solar water splitting solar cells. Oxide thin films such as Fe2O3 and TiO2 films were deposited on FTO glass and Pt coated silicon substrates by R-HIPIMS in Ar+O2 gas mixture using target made of Fe and Ti, respectively. Photoelectrochemical performance of these films was investigated for various conditions and postdeposition annealing. Sulphide semiconductor FeS2 films were deposited by R-HIPIMS in gas mixture of Ar+H2S and pure Fe target. Photoelectrochemical properties of these films were examined in dependence on plasma parameters and postdeposition annealing in H_2S low pressure plasma.

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