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# TARGET SELECTION FOR LIBS STUDIES OF HYDROGEN ISOTOPE RETENTION

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**Abstract.** The study of the hydrogen's isotope retention in the first wall of the fusion reactors is the main task in diagnostics of plasma facing components (PFC). Laser Induced Breakdown Spectroscopy (LIBS) enables in-situ PFC diagnostics without any sample preparation making it a most promising technique for this purpose, see H.J. van der Meiden et al, 2021. The basis of this diagnostics is the measurement of the emission of hydrogen isotopes Balmer alpha lines. The most challenging task is the resolving of these lines. Therefore, the first task was the selection and preparation of the targets from which, due to the laser irradiation and consequent plasma formation, hydrogen and deuterium spectral lines will be emitted. Such targets should be substitutes of the hydrogen isotopes enriched components of PFC of future fusion reactors. The main idea was to use the heavy water $D_2O$ embedded in various substrates that are good absorbers of water. For this purpose, following substrates were tested: NaCl - salt, copper sulfate pentahydrate $CuSO_4 \cdot 5H_2O$ - known as blue vitriol or blue stone, active coal - charcoal, microporous aluminosilicates - zeolites, calcium carbonate $CaCO_3$ - quicklime, $CaSO_4 \cdot 2H_2O$ – gypsum. Several forms of graphite were also considered: factory made graphite discs, electrodes with controlled amount of the $D_2O$ on it and spectroscopically pure (or mixed with silica gel) graphite powder, which was doped with water before or after pressing it by hydraulic press. Testing was performed using a 6 ns Q – switched Nd:YAG and TEA $CO_2$ laser (having 80 ns pulse with 2 μs long tail) in low pressure argon or helium atmosphere. The best results are obtained using gypsum and graphite doped with silica gel, see Traparic at al 2024.

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