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For a proper operation of thermonuclear installations, tritium retention in deposited layers (DL) on plasma facing components (PFC), such as divertors, antennas, chamber walls, etc., is seen as a very serious problem. Tritium cartography is required to determine tritium overall content for a consecutive detritiation. Laser methods for surface characterisation and PFC cleaning were under intensive laboratory studies in CEA, France within the frames of EFDA programs and ITER project[1-4]. Feasibility of LIBS remote measurements was demonstrated with nanosecond Nd-YAG lasers (at 5-10 meter distance, under a reduced pressure) with the samples from the European tokamaks (TORE SUPRA, France and TEXTOR, Germany).

We present here the results on the first successful application of LIBS for remote *in situ* diagnostics of PFC in Joint European Torus (JET), the biggest European tokamak (operating with D/T mixture, Be-chamber walls). LIBS *in situ* application in JET has required a thorough preliminary optimisation and careful adjustment of LIBS interaction parameters, and both optical and detection systems to satisfy the following conditions: 10-meter remote measurements; limited apertures of optical windows and mirrors; high vacuum; tritium and Be environments; a very low repetition rate laser; non-accessible interaction zone; limited time for LIBS experiments authorised by JET. LIBS feasibility was demonstrated with JET EDGE LIDAR laser system (a Ruby laser, 3 Joules/pulse, 690 nm wavelength, 300 ps pulse duration, up to 70 GW/cm^2 intensity, 1 shot per 5 minutes) [5]. A number of analytical spectral lines of D/T, C II, Cr I, W I and Be II in 400-670 nm spectral range were identified. With the increase in the number of the laser shots applied onto a divertor zone (a DL on tungsten-substrate), the spectral line intensities of D/T and from impurities (Cr I, Be II) were decreasing, while the W-spectral lines were appearing in the spectrum. The obtained results and some principal considerations on laser and spectrometer parameters for LIBS *in situ* application in the modern thermonuclear installations (JET, WEST, ITER), and also particular features of tritium cartography will be presented and discussed.

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