Endoscope laser-induced breakdown spectroscopy (LIBS) for *in situ* elemental distribution diagnosis on the surface of divertor in EAST

ID: 3145

[1]Cong Li*, [1]H. Wu, [2]Z. Hu, [1]L. Li, [1]Z. He, [1]R. Hai, [1]D. Wu, [2]F. Ding, [2]R. Ding, [2]G. Luo, [1]H. Ding

[1] School of Physics, Dalian University of Technology, Dalian, P.R. China

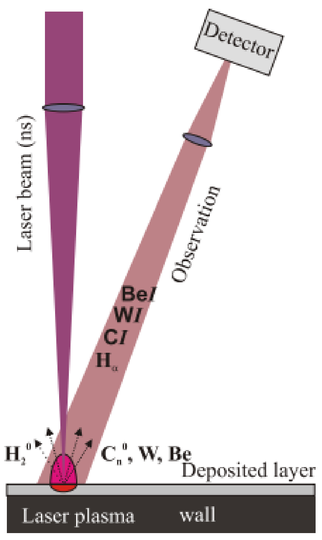
[2] Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, P.R. China

cli@dlut.edu.cn

ABSTRACT

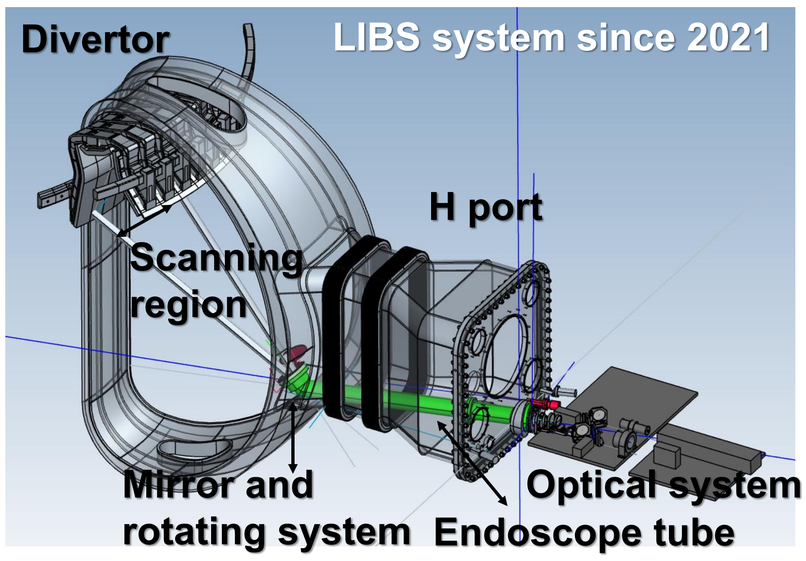
- The online elemental analysis on the PFCs, especially for divertor, is a crucial issue for ITER, as it directly reflects the wall conditions and processes of PWI.
- The spectroscopic diagnostic technology based on the laser ablation plasma provides a promising method for wall composition monitoring.
- An *in situ* endoscopic laser-induced breakdown spectroscopy (LIBS) diagnostic system for the full tungsten divertor in EAST has been developed since 2021 experimental campaign.
- This system provides online elemental distributions on the divertor with various discharge parameters and wall conditions.
- This work provides the key technology of wall elemental diagnosis for the future fusion devices

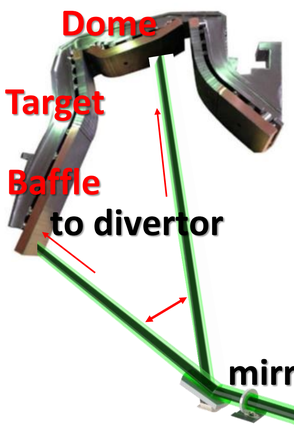
Endoscope LIBS system in EAST



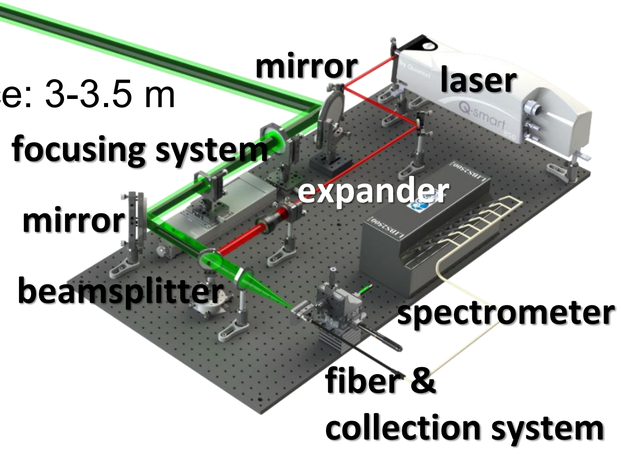
Principle of LIBS

- The endoscope LIBS system was first time used in EAST 2021 campaign;
- LIBS scanning region: inner-target, baffle, dome of W upper divertor and a part of Mo first wall;
- Poloidal scanning step: <0.4 mm;
- Repeatability: <0.2 mm;
- Laser: 1064 nm/6 ns/850 mJ;
- Spectrometer: 400-780 nm;
- All operations were controlled remotely.



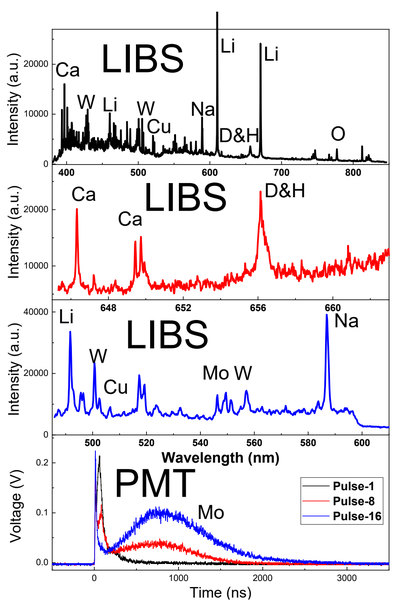


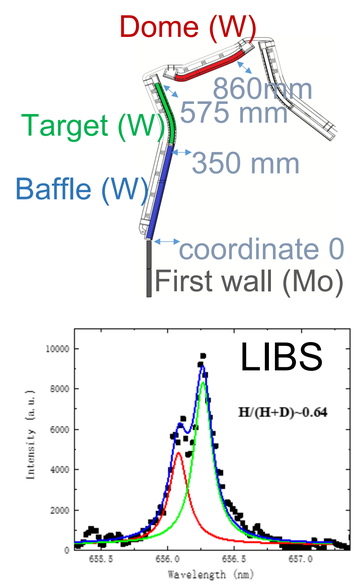
- optical path distance: 3-3.5 m

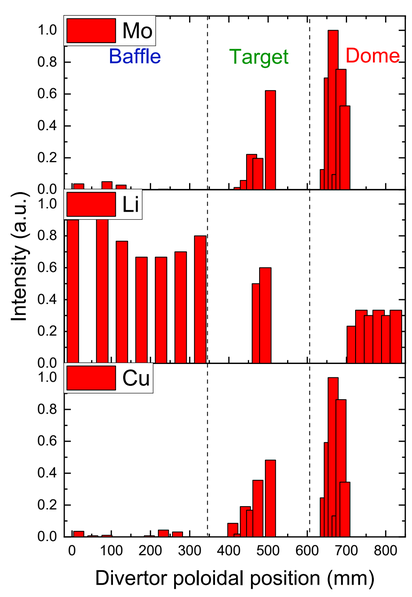


RESULT

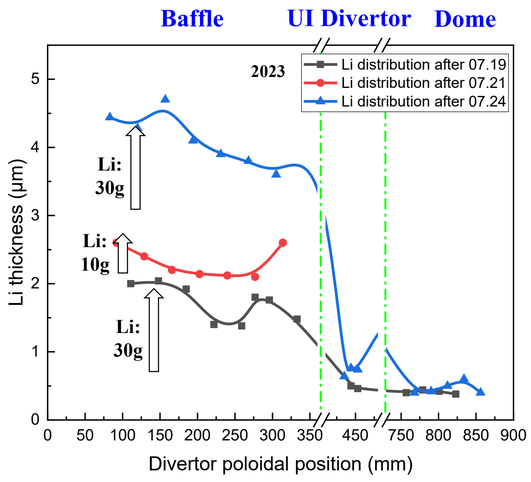
LIBS spectra and elemental poloidal distribution

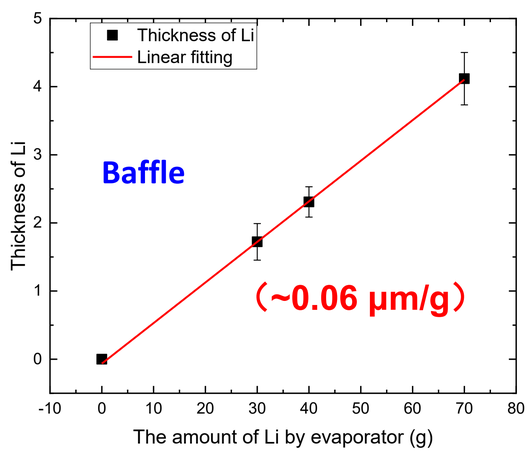




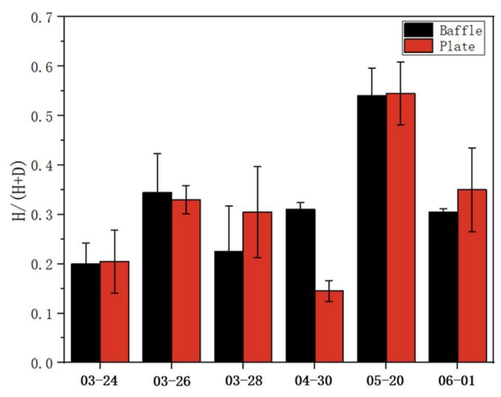


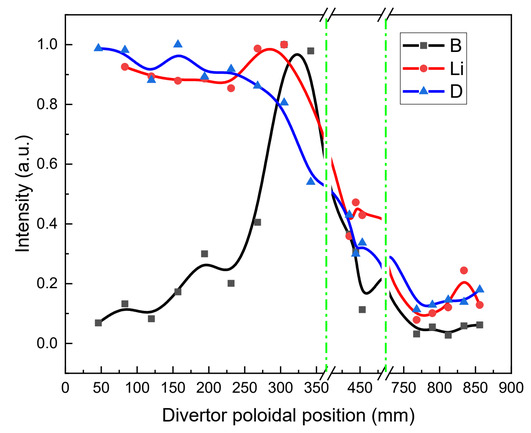
Thickness measurement for deposition layer



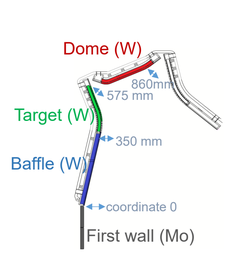


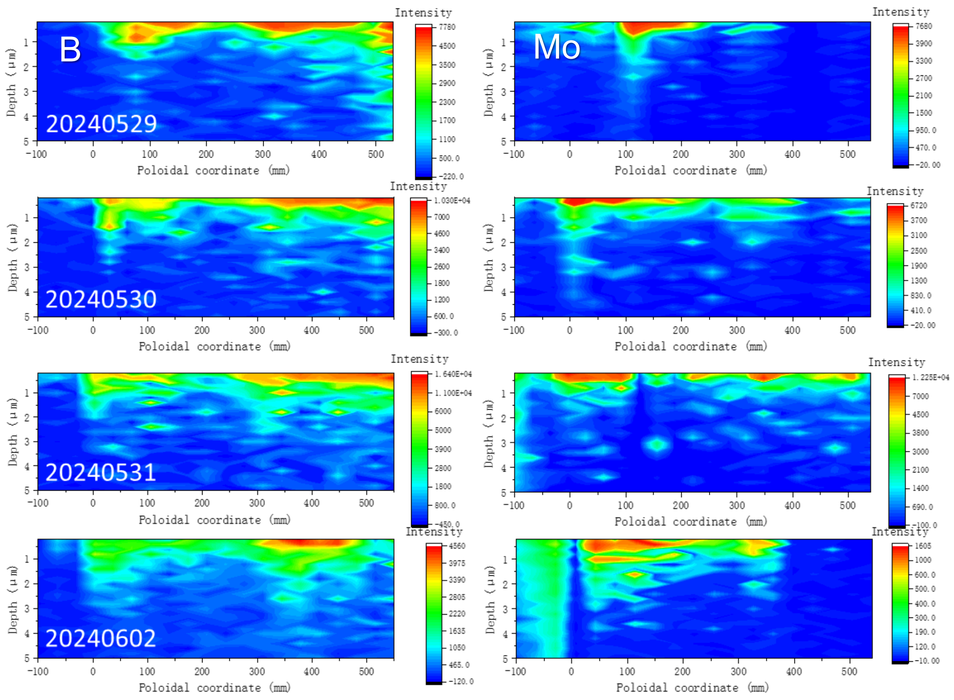
Fuel retention H/(H+D) monitoring





B and Mo distribution (poloidal + depth)





ACKNOWLEDGEMENTS / REFERENCES

- This work was supported by the National Natural Science Foundation of China (Nos. 12375203 and 12375208), the National Key R&D Program of China (Nos. 2024YFE03250100, 2022YFE03200100, 2019YFE03080100, 2023YFF0714900).

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