

**Supplementary Information: Development of a miniature time of flight mass spectrometer coupled with improved substrate-enhanced laser-induced acoustic desorption source (SE-LIAD/TOF-MS)**

Jingxiong Yu,<sup>1</sup> Yuwan Chen,<sup>1</sup> Jiangle Zhang,<sup>1</sup> Shanjun Chen,<sup>1</sup> Qiaolin Wang,<sup>2,3</sup> Zhengbo Qin,<sup>2,a)</sup> and Zichao Tang<sup>1,b)</sup>

<sup>1</sup>*State Key Laboratory of Physical Chemistry of Solid Surfaces, Department of Chemistry, College of Chemistry and Chemical Engineering, Xiamen University, Xiamen 361005, China*

<sup>2</sup>*Anhui Province Key Laboratory of Optoelectric Materials Science and Technology, School of Physics and electronic information, Anhui Normal University, Wuhu, 241002, China*

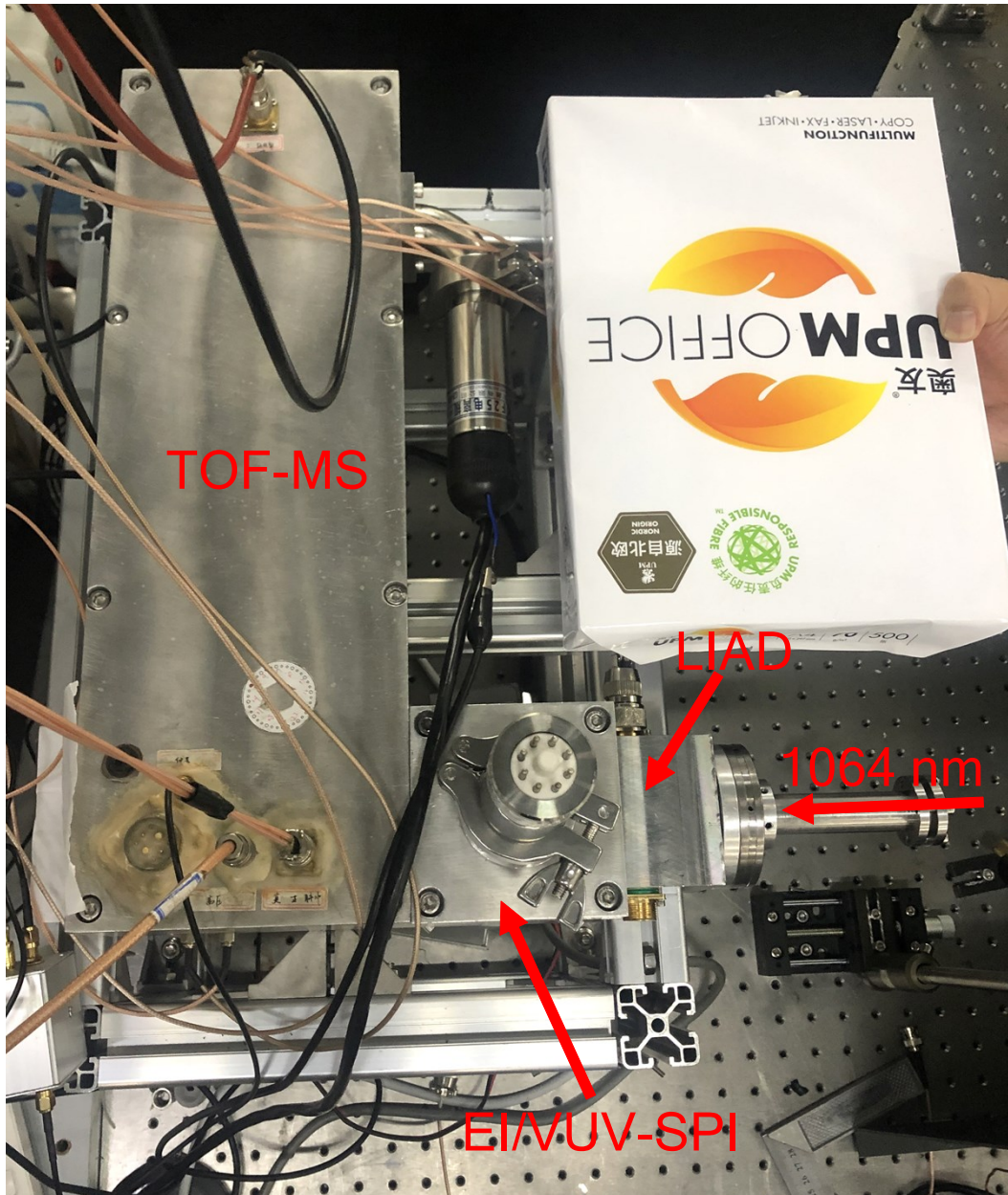
<sup>3</sup>*Key Laboratory of High Power Laser and Physics, Chinese Academy of Sciences, Shanghai 201800, China*

<sup>a)</sup>E-mail: [wave0403@163.com](mailto:wave0403@163.com) (Z. B. Qin);

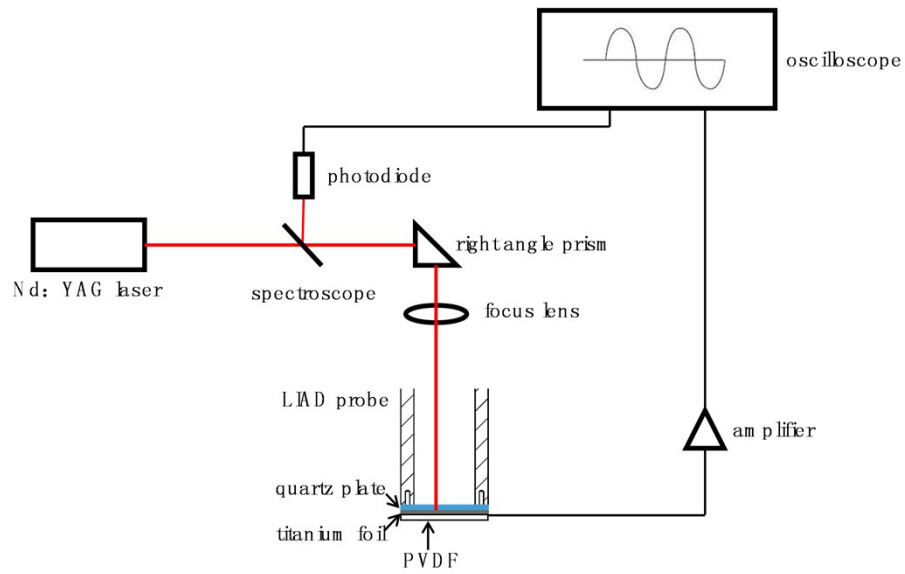
<sup>b)</sup>E-mail: [zctang@xmu.edu.cn](mailto:zctang@xmu.edu.cn) (Z. C. Tang)

### **Details of ultrasonic testing system**

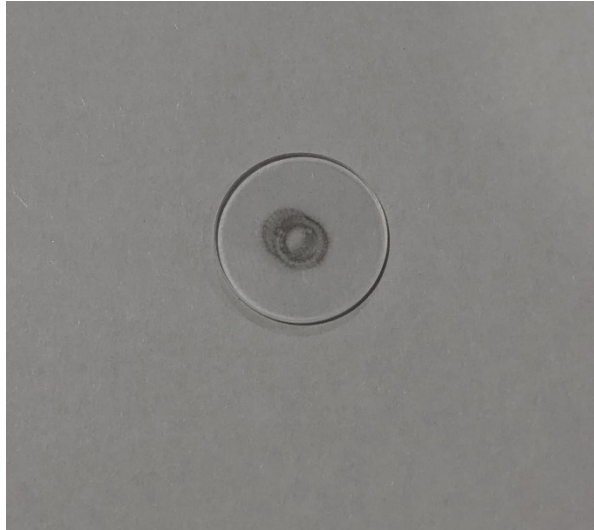
Figure S2 shows the scheme of the experimental setup. The surface acoustic wave is excited by a pulsed laser with a wavelength of 1064 nm (10 mJ), and is focused through a focus lens ( $f = 150$  mm). The light spot is controlled at about 1 mm in diameter. The experimental trigger signal is obtained by illuminating the photodiode with scattered light from the spectroscope. When a pulsed laser excites a surface acoustic wave on the surface of the titanium foil, the surface wave travels along the surface to the position of the detection point, the surface of the material will be slightly deformed. PVDF generates mechanical stress and converts it into electrical signal which is collected by oscilloscope. Under the same conditions, the ultrasonic waveforms on the surface of titanium foil with and without quartz plates were tested.



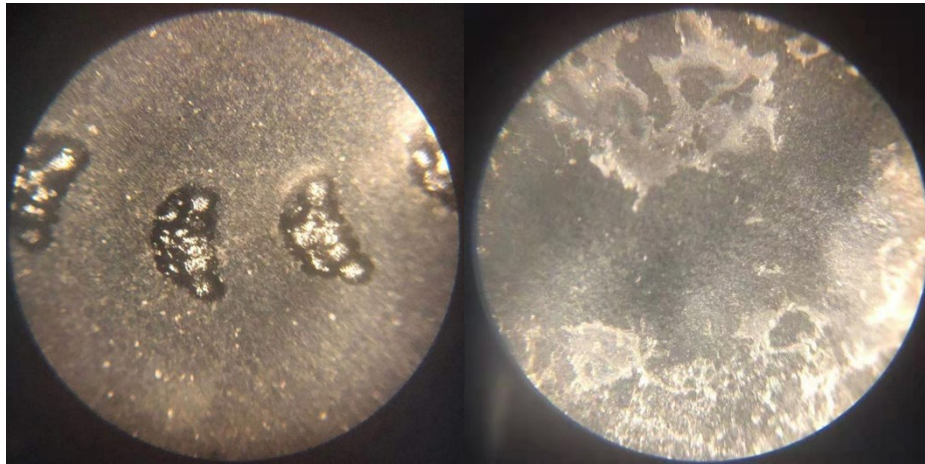
**Figure S1.** The photograph of the SE-LIAD/EI&VUV-SPI/MS instrument.



**Figure S2.** Scheme of laser ultrasound detection system based on PVDF transducer.



**Figure S3.** Surface ablation of quartz plate after SE-LIAD/MS experiment



(a) Back side

(b) Front side

**Figure S4.** The back side (a) and (d) front side of Ti foil (carbazole is deposited on the surface) after the irradiation with the 1064 nm laser beam (blocking the laser radiation when rotating the target).