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Proton and Lithium Ion Production from Composite Targets with Laser Ion Source

For potential applications in compact hadron therapy facilities and accelerator-based neutron sources, the production of proton and lithium ions with the laser ion source was investigated. Proton beams were produced from a compressed titanium hydride powder target. The TOF signals were measured by a 90° cylindrical Electrostatic Ion Analyzer. The comparison between the FC and TOF signals indicates that the yield of titanium ions was negligible. Moreover, the shot-to-shot stability was better than ±5% for the measurement of 300 ion pulses, which confirmed the reliability of the compressed target. Due to the active chemistry of lithium, the surface of the lithium target had been oxidized heavily during the preparation of the experiment. The results showed that the produced ions in the second laser shot were almost lithium ions, while those were mainly contaminant ions in the first shot at the same position, which provide us an approach to produce lithium ions with the laser ion source.

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