

## 4 - 28 Calorimetric Measurement of Deposited Energy by Heavy Ion Beams Impact on Diamond Target\*

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Highly charged ions (HCIs) carrying amount of potential energy will produce some new physical phenomena because the potential energy will be deposited into a very small volume within a very short time. We would apply the calorimetric method to study the energy deposition of HCIs<sup>[1,2]</sup>. Herein we introduce the new setup for calorimetric measurement for the potential energy deposition of highly charged ions at 320 kV Highly Charged Ions Physics Experimental Platform.

The setup was constructed by 3 parts: the Dewar, the electrical temperature controller and the main part. The diamond target was connected to the LN<sub>2</sub> cooled heat sink by 4 copper wires and a Platinum temperature sensor was glued to the rear side of the target. As shown in Fig. 1.

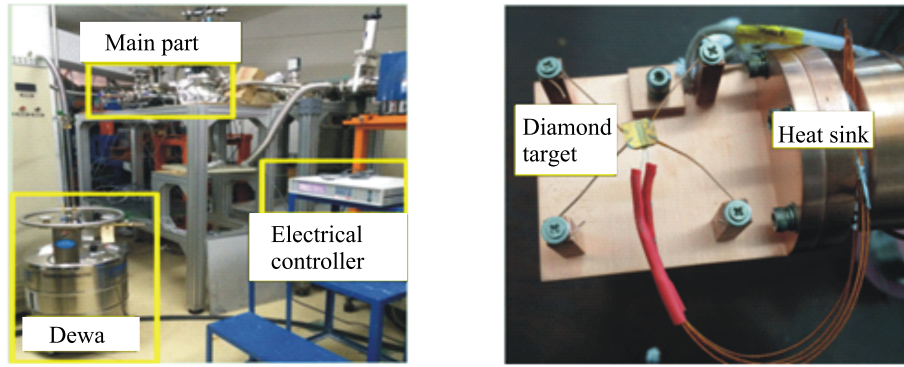


Fig. 1 The 3 parts of calorimetric setup (left) and the experimental diamond target (right).

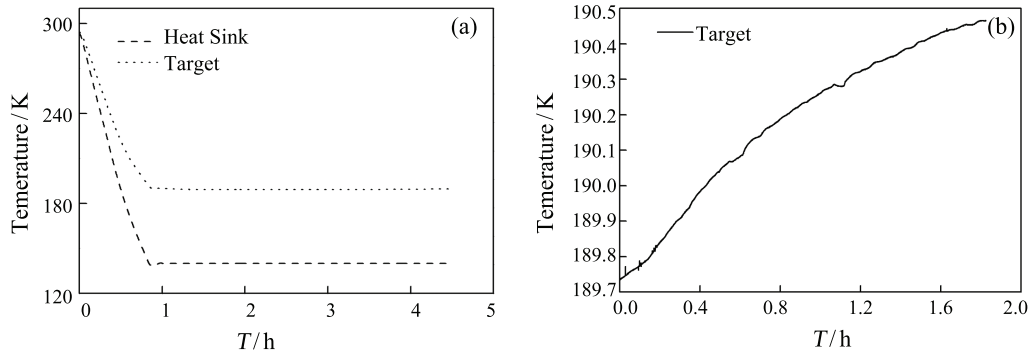


Fig. 2 The temperature profiles in different situations. (a) Cooling the target and the sink from room temperature to a stable temperature. (b) Starting the ion (250 keV He<sup>2+</sup>) irradiation to the target.

Fig. 2 shows the test experimental results. It is found that after a long time, the temperature of target becomes very stable within the change of 10 mK, and when starting the irradiation, the target temperature start increasing while the temperature of heat sink keeps constant as before. The rate of the deposited energy over the initial kinetic energy is deduced as  $35\% \pm 15\%$  and the error mainly comes from the beam current measurement.

The systemic experimental investigation on highly charged ions impact on matter will be carried out soon.

### References

- [1] D. Kost, S. Facsko, W. Möller, et al., Phys. Rev. Lett, 98(2007)225503.
- [2] U. Kentsch, H. Tyrroff, G. Zschornack, et al., Phys. Rev. Lett, 87(2001)105504.

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