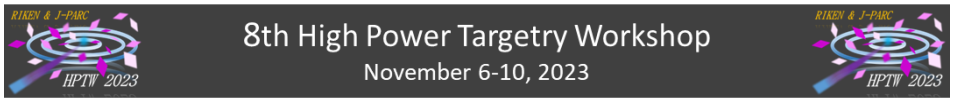


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# Recent Advancements and in-house capabilities in Thermal and Mechanical Characterization of Conventional and Novel Materials

*Thursday, 9 November 2023 11:15 (15 minutes)*

In this presentation, we showcase the latest capabilities and breakthroughs achieved in our laboratory using state-of-the-art instruments, namely the dilatometer, differential scanning calorimeter (DSC), and nanoindenter. Through rigorous experimentation, we have examined the thermal and mechanical properties of various materials, including conventional materials such as graphite and titanium alloy, as well as novel materials like High Entropy Alloys (HEA) and ceramic nanofibers. The dilatometer and DSC were employed to evaluate essential thermal properties, such as specific heat and thermal expansion coefficients, of newly developed High Entropy Alloys (HEA). These properties were then compared against simulation results to assess their accuracy and validate the effectiveness of the instruments. Additionally, we present the first-ever evaluation of specific heat for zirconia nanofibers, shedding light on their unique thermal behavior. Moreover, the nanoindenter was utilized to investigate the strain rate dependent hardness properties of ion-irradiated and unirradiated graphite samples. The mechanical response of these samples under varying strain rates provides critical insights into their structural stability and potential applications in radiation-exposed environments. Our findings demonstrate the significance of the acquired capabilities in understanding the fundamental thermal and mechanical characteristics of these novel. The utilization of these advanced techniques allows for more comprehensive and reliable assessments of both conventional and novel materials, opening doors to innovative research and development in high power targetry.

## Themes for the contribution

1 R&D to support concepts

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