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Updates in Material R&D for multi-MW Accelerator Components under US-Japan and RaDIATE Collaboration in High Energy Physics

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With the projected increase in beam intensities at forthcoming multi-megawatt accelerator facilities, it is crucial to address the challenges posed by greater thermal stress waves and dynamic loads experienced by beam intercepting components like beam windows and targets. Additionally, these components are susceptible to radiation damage, which can significantly impact their operational lifespan. Therefore, understanding the mechanisms behind such damage in accelerator conditions and implementing effective mitigation strategies become imperative. US Japan collaboration in high energy physics has been instrumental in supporting this research over the past several years and committed to do so in future. With its support we have carried out several activities in material testing, focusing on characterizing damage induced by proton beam irradiation and its consequent effects on mechanical properties of both existing and novel materials. A Thermal-shock experiment was carried out using intense pulsed proton beam at CERN on variety of novel materials and alloy to check the survivability of potential novel materials in future high-power accelerators and preliminary results are presented. Future research activities are planned and funding is secured from the funding agency for the next two years.

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