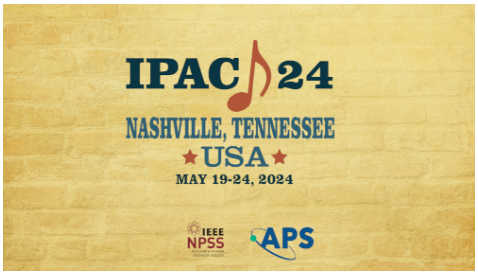

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Novel materials for next-generation accelerator target facilities

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As beam power continues to increase in next-generation accelerator facilities, high-power target systems face crucial challenges. Components like beam windows and particle-production targets must endure significantly higher levels of particle fluence. The primary beam's energy deposition causes rapid heating (thermal shock) and induces microstructural changes (radiation damage) within the target material. These effects ultimately deteriorate the components' properties and lifespan. With conventional materials already stretched to their limits, we are exploring novel materials including High-Entropy Alloys and Electrospun Nanofibers that offer a fresh approach to enhancing tolerance against thermal shock and radiation damage. Following an introduction to the challenges facing high-power target systems, we will give an overview of the promising advancements we have made so far in customizing the compositions and microstructures of these pioneering materials. Our focus is on optimizing their in-beam thermomechanical and physics performance. Additionally, we will outline our imminent plans for in-beam irradiation experiments and advanced material characterizations.

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