The damage analysis in $Y_3Fe_5O_{12}$/Pt interface for the irradiation tolerant spin-driven thermoelectric device

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The combination of spin-driven thermoelectric (STE) devices based on spin Seebeck effect (SSE), and radioactive isotopes as heat sources, has potential as a next-generation method of power generation in applications such as power supplies for space probes. However, there has been no data thus far indicating the irradiation tolerance of spin thermoelectric devices.

Through analysis using a heavy ion beam accelerator and the hard X-ray photoemission spectroscopy (HAXPES) measurements, it was shown that a prototypical STE device based on $Y_3Fe_5O_{12}$/Pt bilayer systems has tolerance to irradiation of high-energy heavy ion beams[1]. The HAXPES measurements suggest that the chemical reaction that diminishes the SSE signals[2] is facilitated by increasing the irradiation dose. We share the current understandings of the damage analysis in $Y_3Fe_5O_{12}$/Pt for developing better STE devices applicable to the harsh environmental usages.

[1] S. Okayasu *et al.*, "Tolerance of spin-Seebeck thermoelectricity against irradiation by swift heavy ions," J. Appl. Phys. **128**, 083902 (2020).

[2] M. Kobata *et al.*, "Hard X-ray Photoelectron Spectroscopy Study of Pt/$Y_3Fe_5O_{12}$," JPS Conference Proceedings **30,** 011192 (2020).