Supplementary Information (SI) for New Journal of Chemistry.
This journal is © The Royal Society of Chemistry and the Centre National de la Recherche Scientifique 2025

Supplementary materials

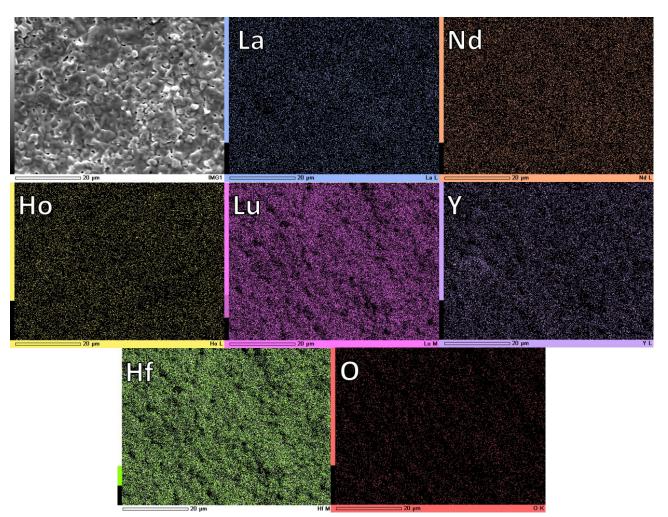


Figure S1a. SEM image and X-ray maps of La, Nd, Ho, Lu, Y, Hf, and O of $(La_{0.2}Nd_{0.2}Ho_{0.2}Lu_{0.2}Y_{0.2})_2HfO_5$, fluorite based HEO composite, synthesized at 1610 °C.

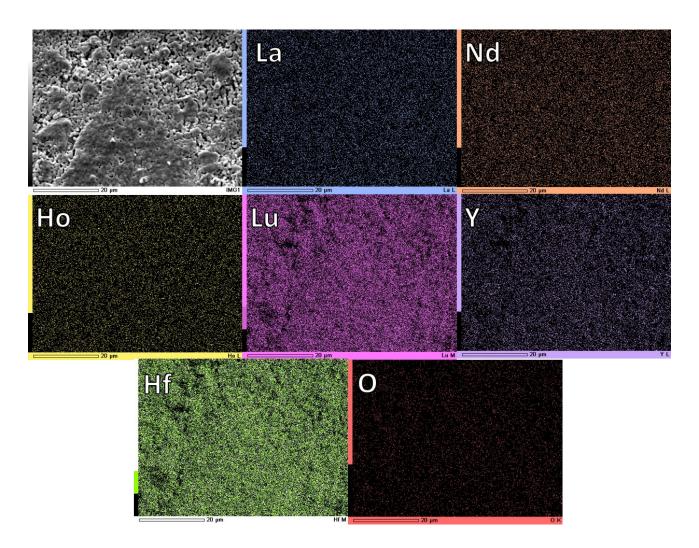


Figure S1b. SEM image and X-ray maps of La, Nd, Ho, Lu, Y, Hf, and O of $(La_{0.2}Nd_{0.2}Ho_{0.2}Lu_{0.2}Y_{0.2})_2Hf_2O_7$, pyrochlore-based HEO composite, synthesized at $1600^{\circ}C$, 4h.

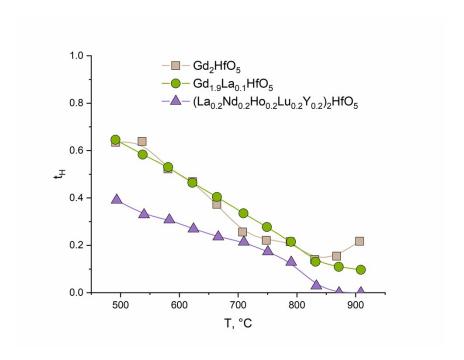


Fig. S2. Proton transfer coefficients in Gd_2HfO_5 , $Gd_{1.9}La_{0.1}HfO_5$, $(La_{0.2}Nd_{0.2}Ho_{0.2}Lu_{0.2}Y_{0.2})_2HfO_5$ ceramics.