

## Supporting Information

### **Synthesis, structure, and electronic properties of $\text{Li}_{11}\text{RbGd}_4\text{Te}_6\text{O}_{30}$ single crystal**

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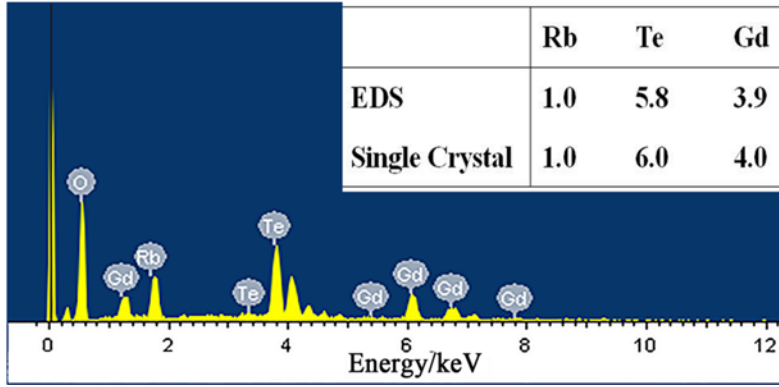
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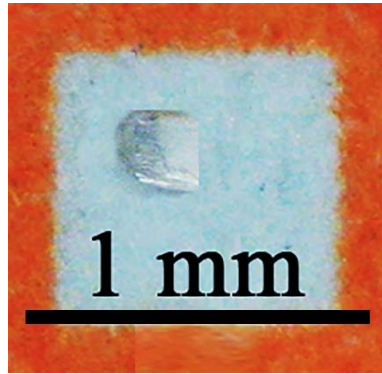
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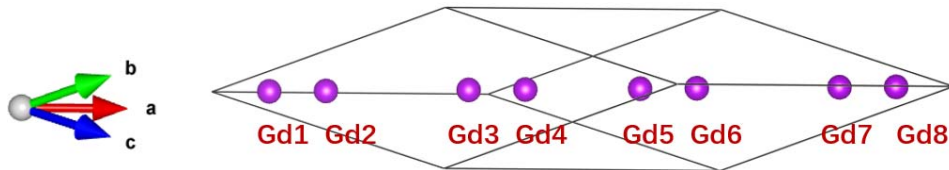
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**Fig. S1.** EDS result for  $\text{Li}_{11}\text{RbGd}_4\text{Te}_6\text{O}_{30}$ .



**Fig. S2.** Optical image of micrometer-sized single crystal  $\text{Li}_{11}\text{RbGd}_4\text{Te}_6\text{O}_{30}$ . The crystal is colorless and transparent in the visible light.



**Fig. S3.** Eight Gd ions in a primitive cell of  $\text{Li}_{11}\text{RbGd}_4\text{Te}_6\text{O}_{30}$ . Other ions are omitted. Please note that Gd1 and Gd2 form a dimer. But the distance between the Gd2 and Gd3 is longer than  $7 \text{ \AA}$ , which are not the nearest dimers. The nearest dimers (distance of about  $5.4 \text{ \AA}$ ) could only be shown in a conventional cell. Similarly, Gd4 and Gd5 (Gd6 and Gd7) are not the nearest dimers.