Supporting Information

Epitaxial Thin Film Growth of Perovskite Hydrides $M\mathrm{LiH_3}$ (M : Sr, Ba) for The Study of Intrinsic Hydride-Ion Conduction

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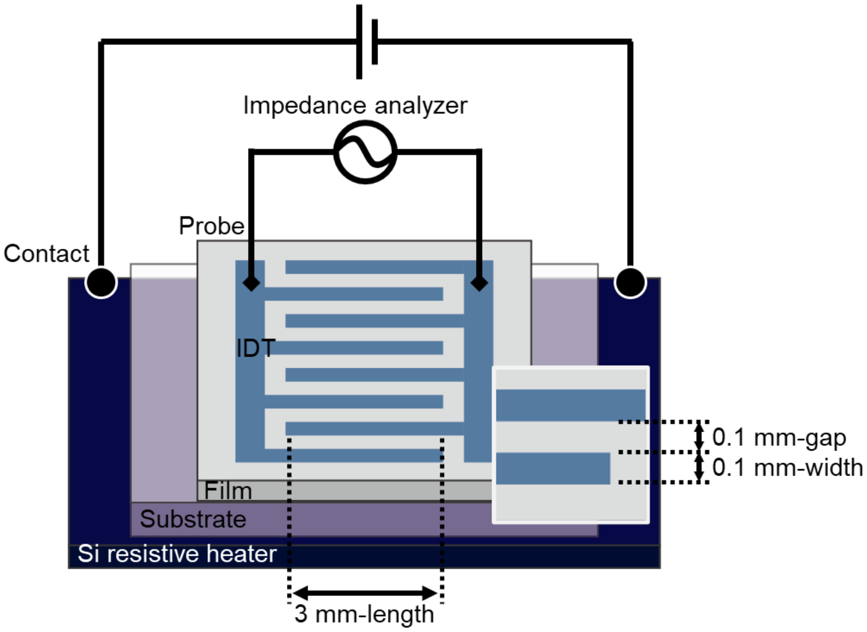

Figure S1. Schematic of the in-plane ionic conductivity measurement setup: Mo comb-shpaed electrode consists of about 10 parallel teeth (the number of teeth was varied depending on the sample size), each with an overlap length of 3 mm and a width and spacing of 0.1 mm. To heat the film, a Si plate (conductivity: 0.01-0.02 Ωcm) placed at the bottom of the substrate was used as a resistance heater. Assuming temperature equilibrium between the Si plate and the sample, the sample temperature was determined by measuring the temperature of the Si plate using a radiation thermometer (TMHX-TME0050(H), Nihon Sensor Co.)

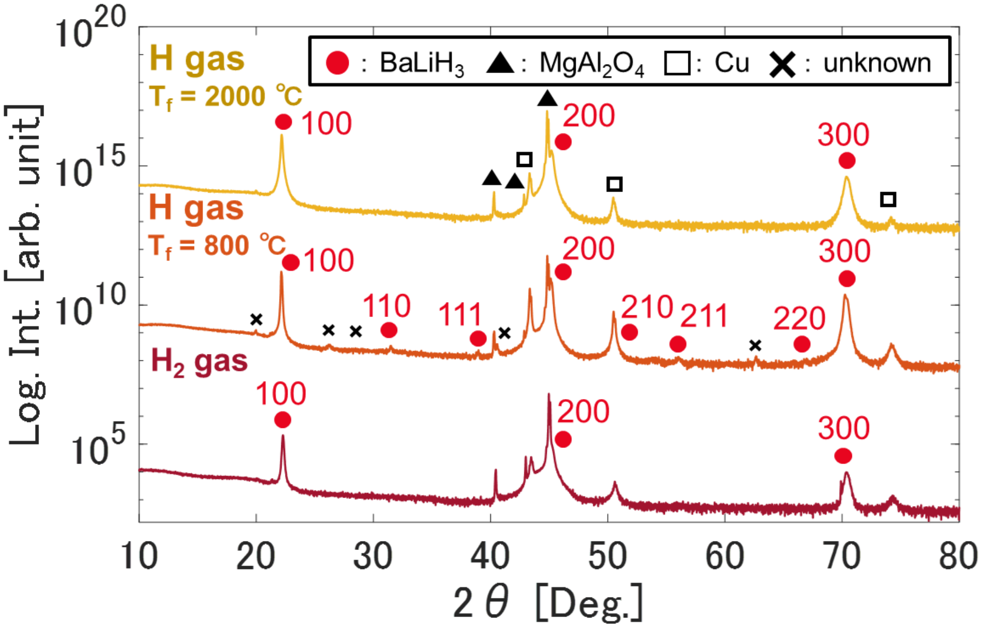

Figure S2. $2\theta/\theta$ XRD diffraction patterns of $BaLiH_3$ thin films with different reaction gases. Diffraction peaks attributed to $BaLiH_3$ appear in all gas conditions.

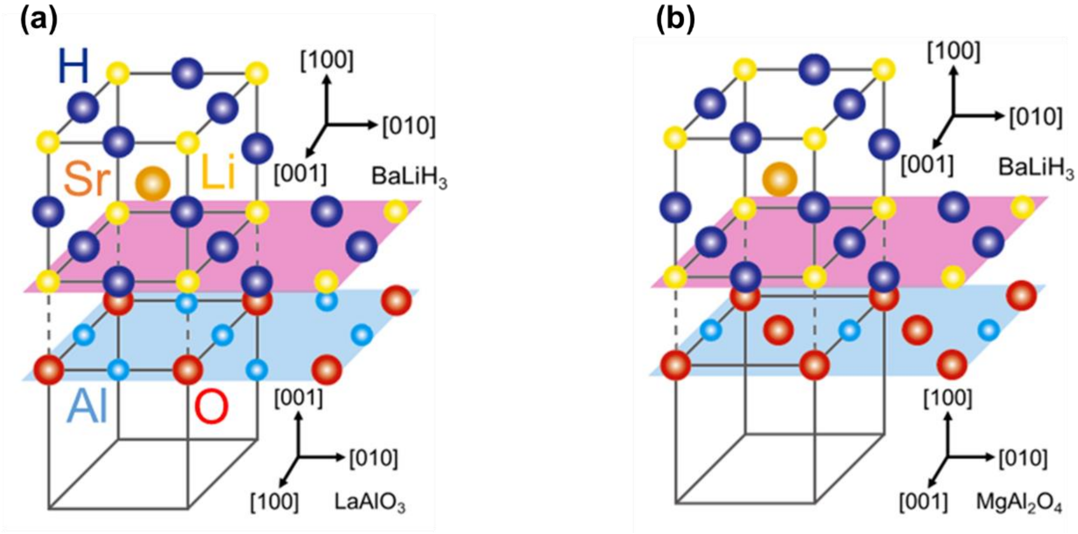

Figure S3. Atomic arrangement of the epitaxial thin film on (a) MgAl$_2$O$_4$ and (b) LaAlO$_3$ substrate as predicted from the XRD diffraction pattern shown in Figure 6.

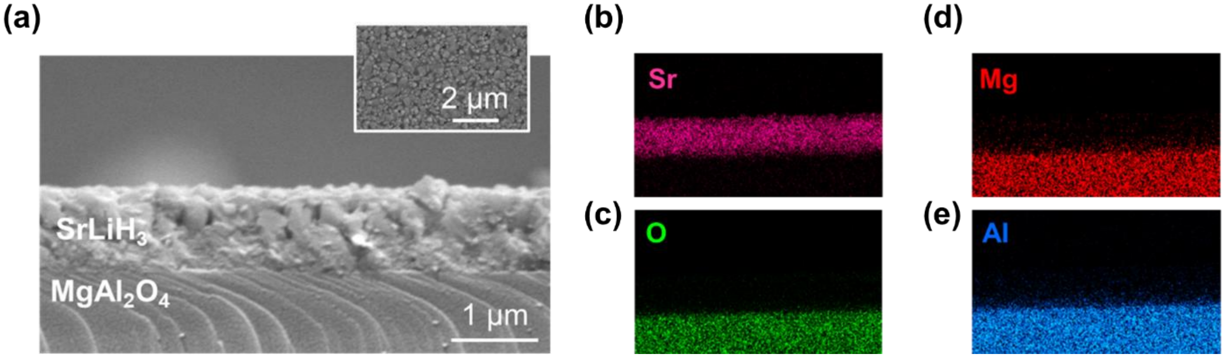

Figure S4. (a) SEM cross section of $SrLiH_3$ epitaxial thin film grown on $MgAl_2O_4$ substrate and EDS mapping for (b) Sr, (c) O, (d) Mg, and (e) Al elements. Inset shows surface SEM image.