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Supplementary Information

Enhancing Thermoelectric Performance for ZnO Epitaxial Films by Ga Doping and Thermal Tuning

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Measurement details of ZEM-3

The electrical properties of samples in this work were measured by a commercial machine, ZEM-3 (ULVAC-RIKO, Japan). To measure σ and S from 300 K to 623 K under a helium atmosphere using the ZEM-3, the films will be firstly fixed to a homemade Al_2O_3 ceramic holder on both ends by smearing silver conductive adhesive, and then put in an oven at 323 K for 5 min, as shown in **Fig. S1 (ESI)**. After that, the σ and S values could be measured by the four-probe method, and the settings are almost the same as usual, except the setting of thickness for samples. The thickness is the real thickness of thin film measured by AFM.

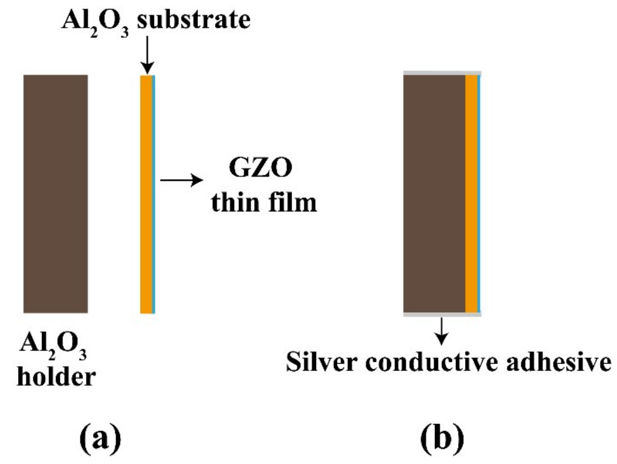

Fig. S1 Preparing samples for measuring electrical properties by using ZEM-3