

Supplementary information

Absence of superconductivity in $I4/mmm$ -FeH₅: experimental evidence

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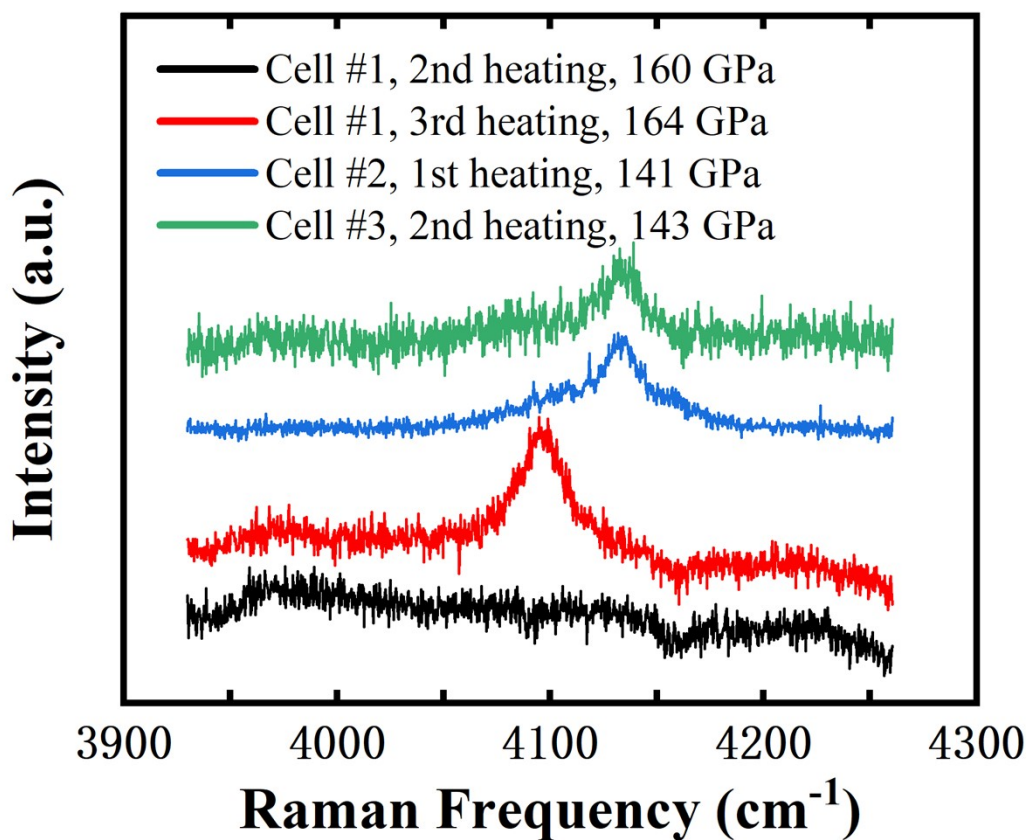


Figure S1. Raman spectra after the laser heating. The peaks at ~ 4100 and ~ 4130 cm⁻¹ due

to the ν_1 mode of hydrogen¹⁻⁴.

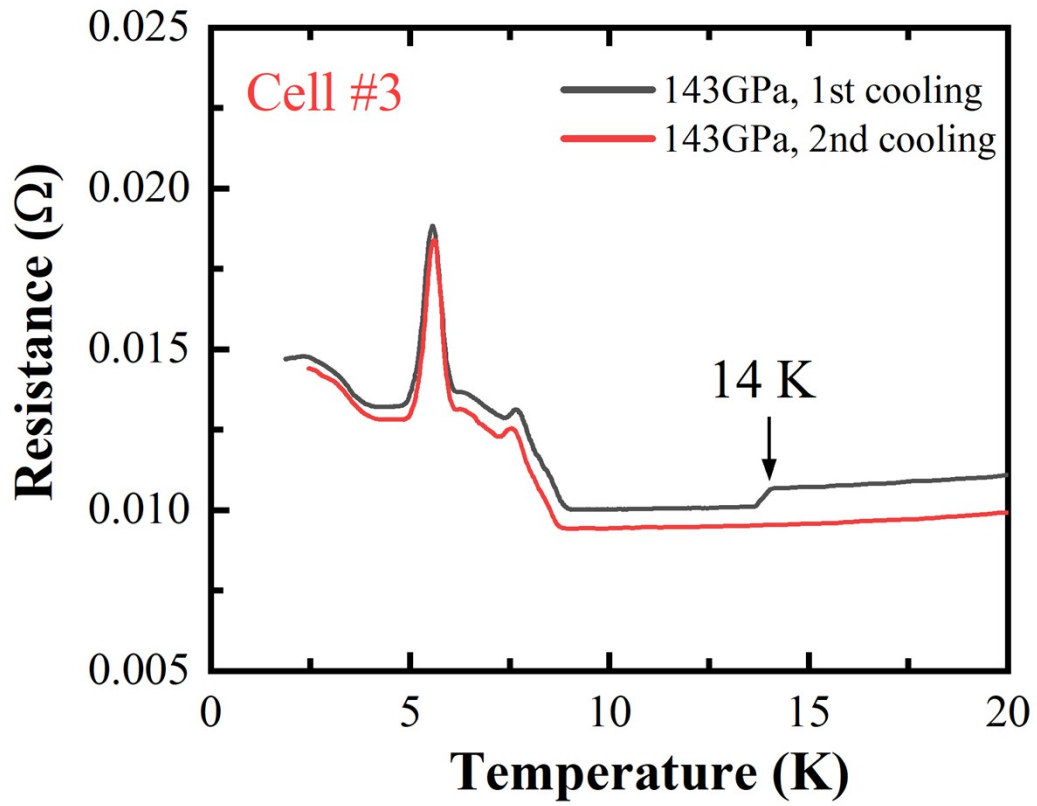


Figure S2. Two resistance measurements at 143 GPa in Cell #3. Red line and black line respectively represent the data in first and the second cooling. Except the drop in 14 K, two curves showed the same trends.

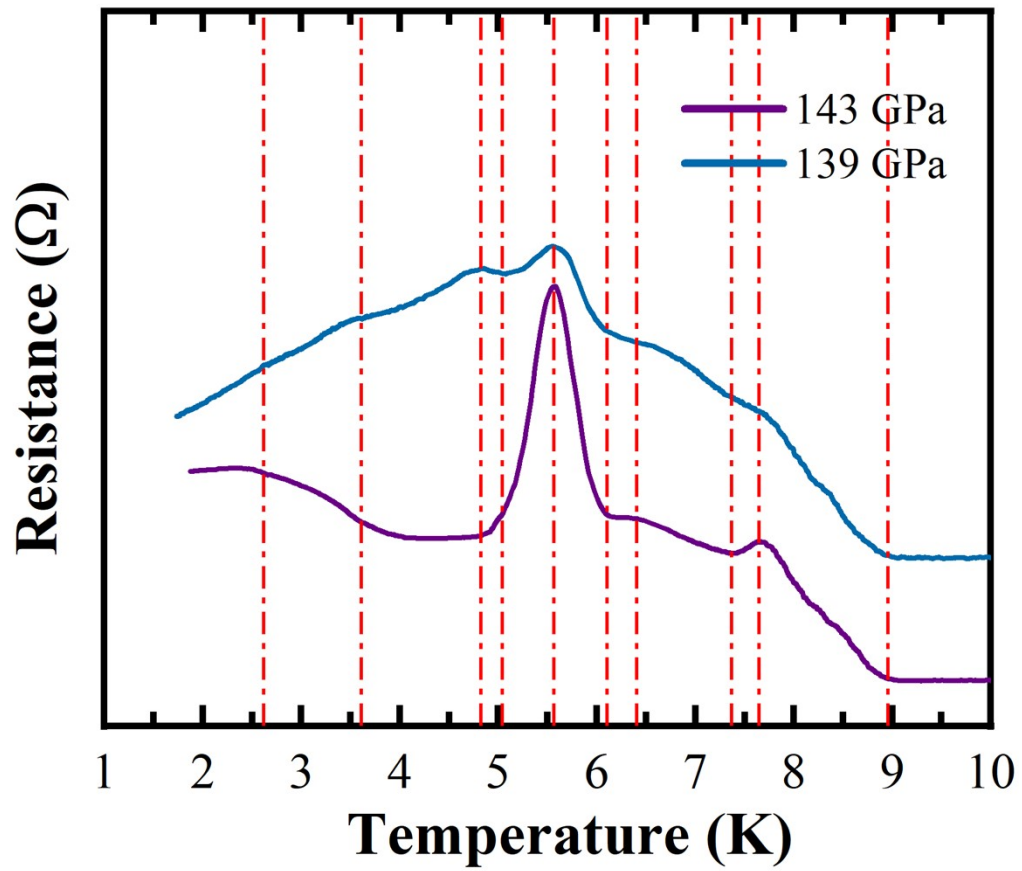


Figure S3. Two resistance measurements at 143 GPa and 139 GPa in Cell #3. Vertical reference lines indicate that the bends of two curves are in the same temperatures respectively.

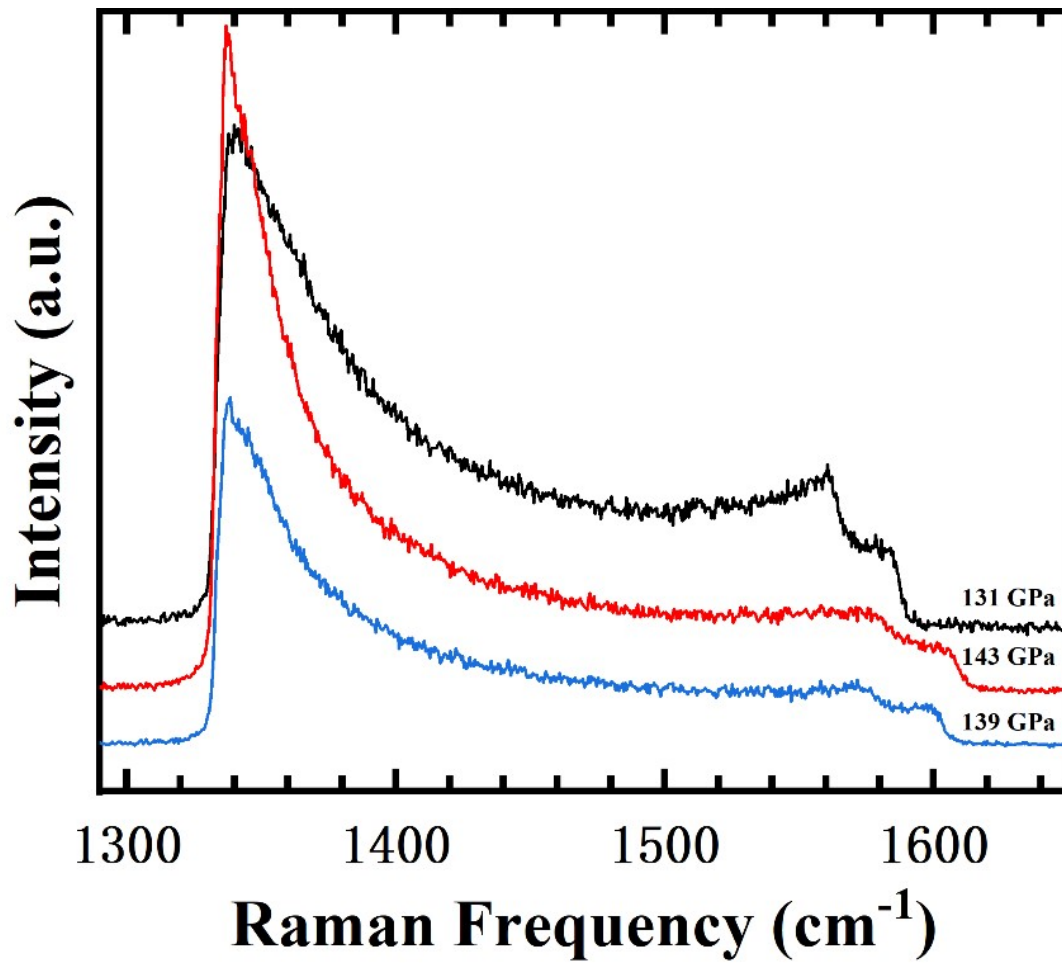


Figure S4. The pressure of Cell #3 determined by the first-order Raman spectra of diamond.

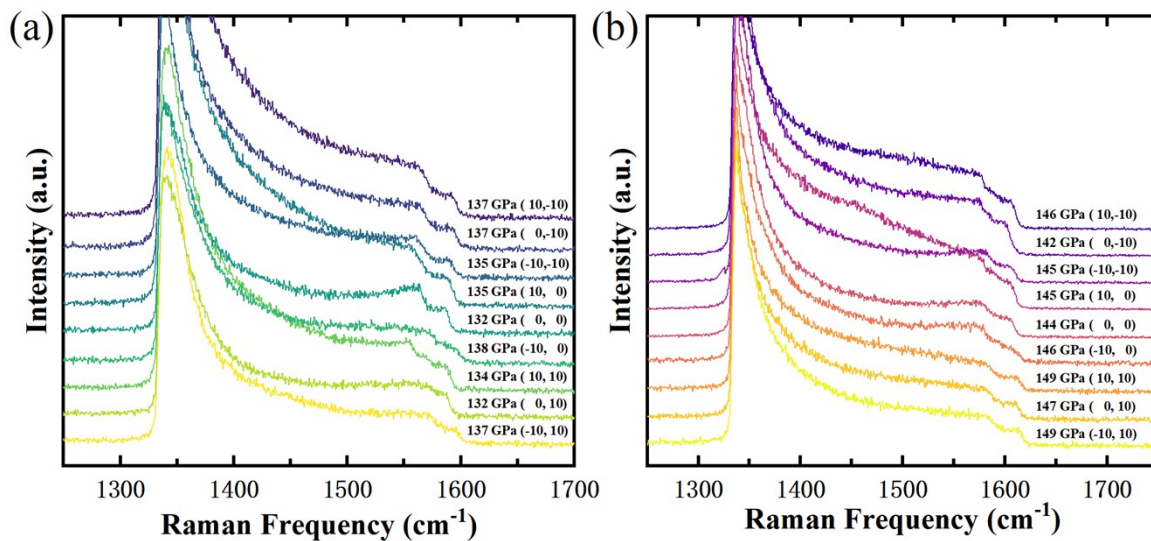


Figure S5. Raman spectra of diamond for Cell #3 at different positions. (a) Pressure measured in the center of diamond culet with a step of 10 μm after the first laser heating. (b) Pressure measured in the center of diamond culet with a step of 10 μm after the second laser heating.

Table S1. The lattice parameters and R-values of refinements in Cell #3.

<i>P6₃/mmc</i> Fe					Le Bail fit		Rietveld fit
Cell	P (GPa)	a=b (Å)	c (Å)	V (Å ³)	R _p	wR _p	wR
#3	143	2.2527	3.6053	15.8445	48.05	64.40	40.41
<i>I4/mmm</i> FeH ₅					Le Bail fit		Rietveld fit
Cell	P (GPa)	a=b (Å)	c (Å)	V (Å ³)	R _p	wR _p	wR
#3	139	2.4172	11.6647	68.1552	48.88	65.49	49.90

Reference

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4. A. F. Goncharov, R. T. Howie and E. Gregoryanz, *Low Temp. Phys.*, 2013, **39**, 402-408.