

**Supplemental Material for:**  
**Magnetic and electronic ordering phenomena in the [Ru<sub>2</sub>O<sub>6</sub>] honeycomb lattice  
compound AgRuO<sub>3</sub>**

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TABLE I. Experimentally observed frequencies at  $T = 77$  K and calculated frequencies at 0 K along with assigned mode symmetries of the ( $R\bar{3}c$ ) trigonal state of  $\text{AgRuO}_3$ .

Mode index	Experimentally observed ( $\text{cm}^{-1}$ ) (77 K)	Calculated ( $\text{cm}^{-1}$ ) (0 K)	Assigned symmetry
M1	71.2	70.4	$E_g$
M2	92.5	87.1/90.3	$A_{1g}/E_g$
M3	175.9	179.0	$A_{1g}$
M4	193.0	198.1	$E_g$
M5	200.0	202.2	$E_g$
M6	311.4	303.7/309.1	$E_g$
M7	332.5	344.0	$A_{1g}$
M8	480.0	478.6	$E_g$
M9	495.0	484.1/486.2/499.7	$E_g$
M10	526.0	527.9	$E_g$
M11	552.3	557.3	$A_{1g}$
M12	595.8	579.5/580.1	$A_1/A_{2u}$

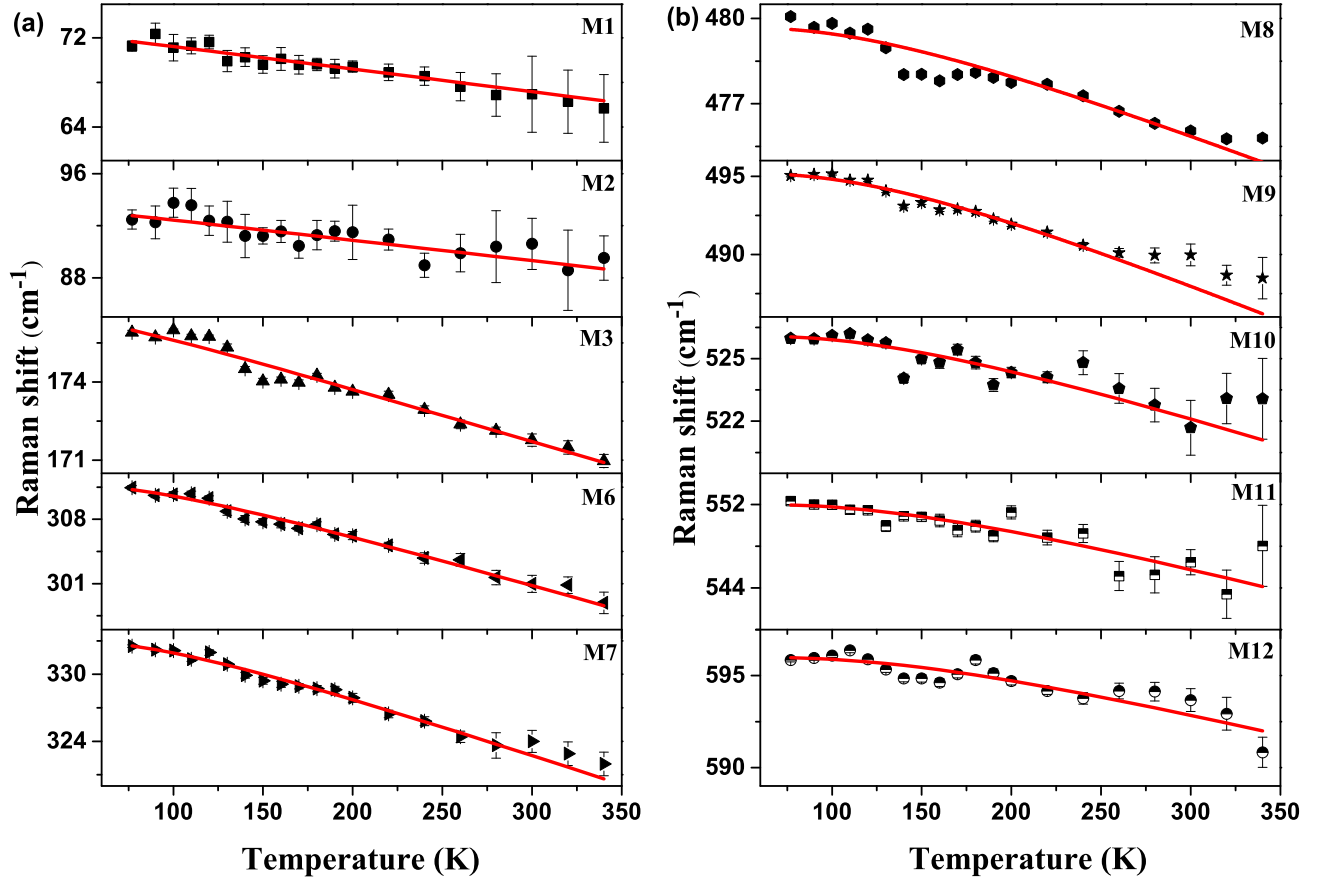


FIG. 1. Temperature dependence of phonon frequencies of the Raman modes of  $\text{AgRuO}_3$ . The error bars are also displayed and are less than the size of the symbol when not shown. The red solid lines are fit to a simple cubic anharmonic model to the experimental data.

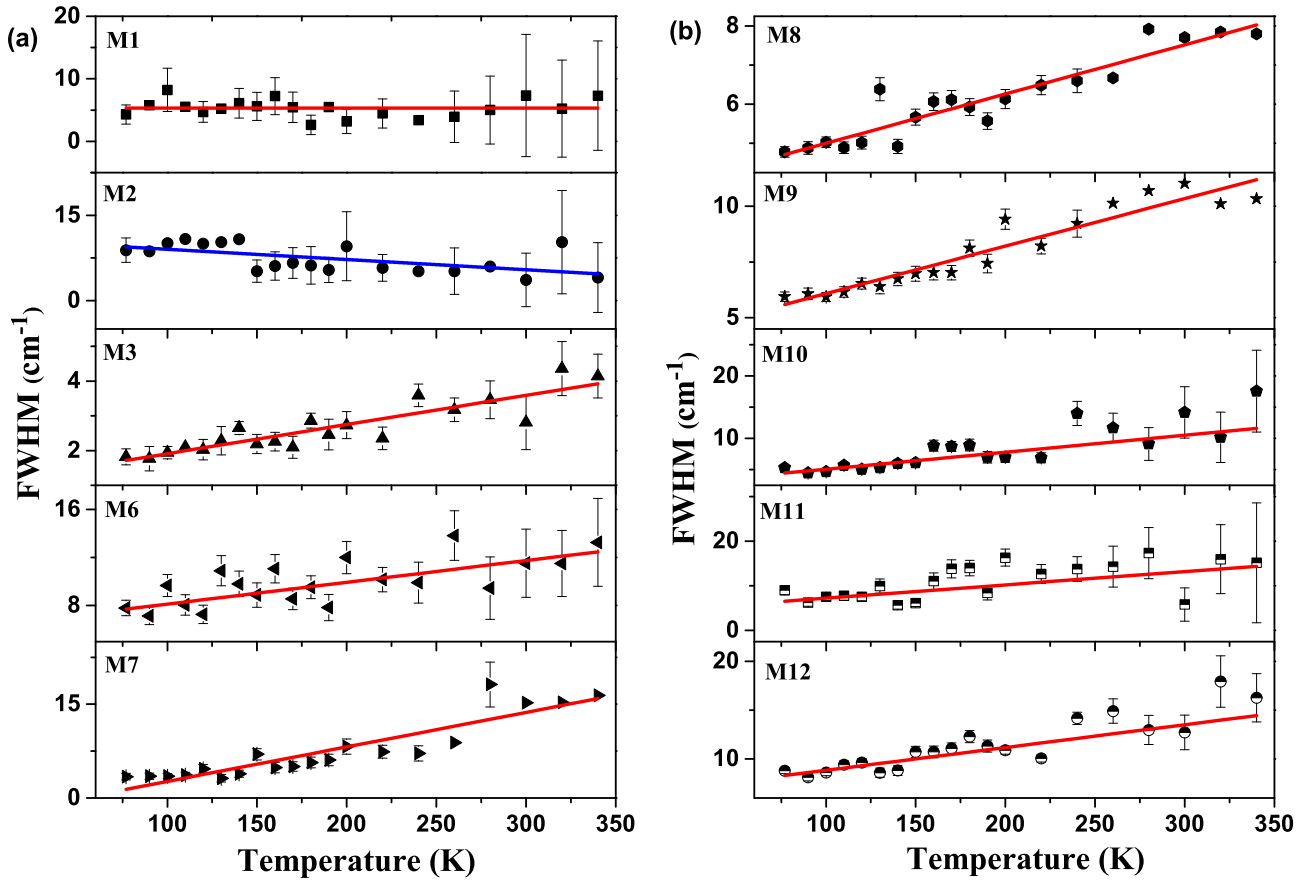


FIG. 2. Temperature dependence of phonon linewidths of the Raman modes of  $\text{AgRuO}_3$ . The red solid lines are fit to a simple cubic anharmonic model to the experimental data. FWHM of the mode M2 remains almost constant and the solid blue line linear fit to the data.

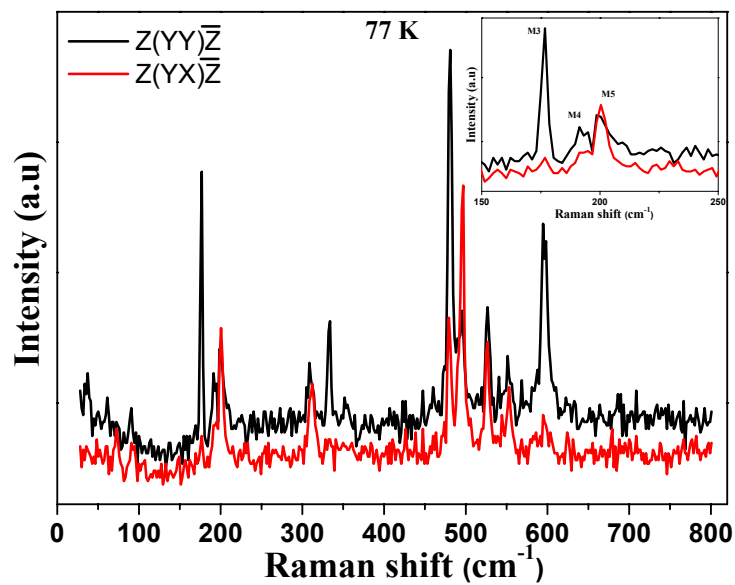


FIG. 3. Raman spectra of  $\text{AgRuO}_3$  measured at  $T = 77$  K in different polarization geometries. The inset shows zoomed-in spectra in the range  $150\text{--}200\text{ cm}^{-1}$  confirming the presence of modes M4 and M5 in both parallel and crossed polarization configurations.