

Figure S1. EDX spectrum and indexed electron-diffraction patterns (FFT) from HRTEM images for ellinaite from diamond-hosted inclusion, foil #3601, Brazil. CuK_α X-ray intensity comes from the copper grid of the TEM foil rests on (adapted from Kaminsky et al., 2015).

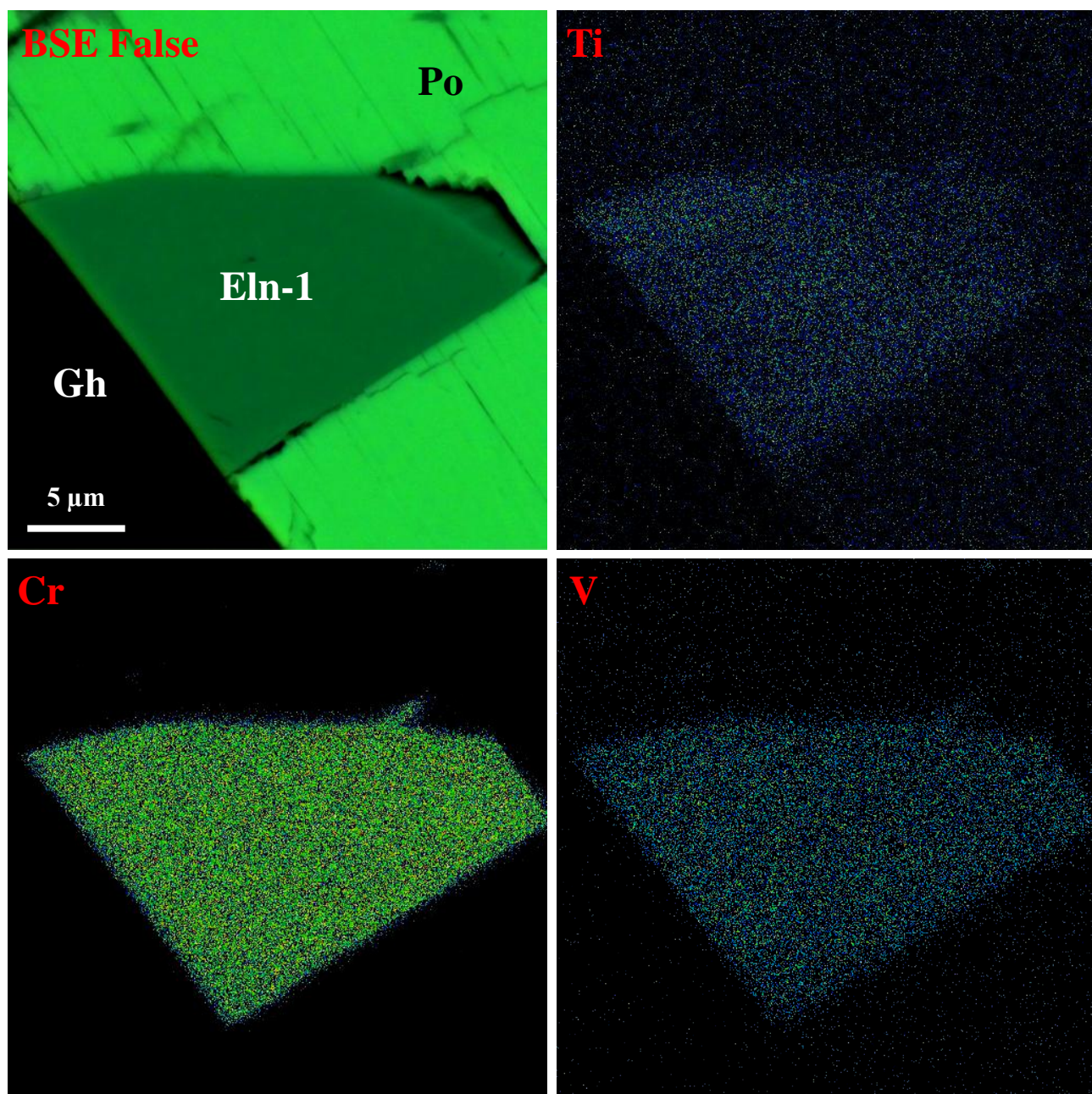


Figure S2. Elemental maps for grain of CaCr_2O_4 from Hatrurim Basin, Israel. Symbols: Eln-1 – ellinaite-1 grain; Po – pyrrhotite; Gh – gehlenite.

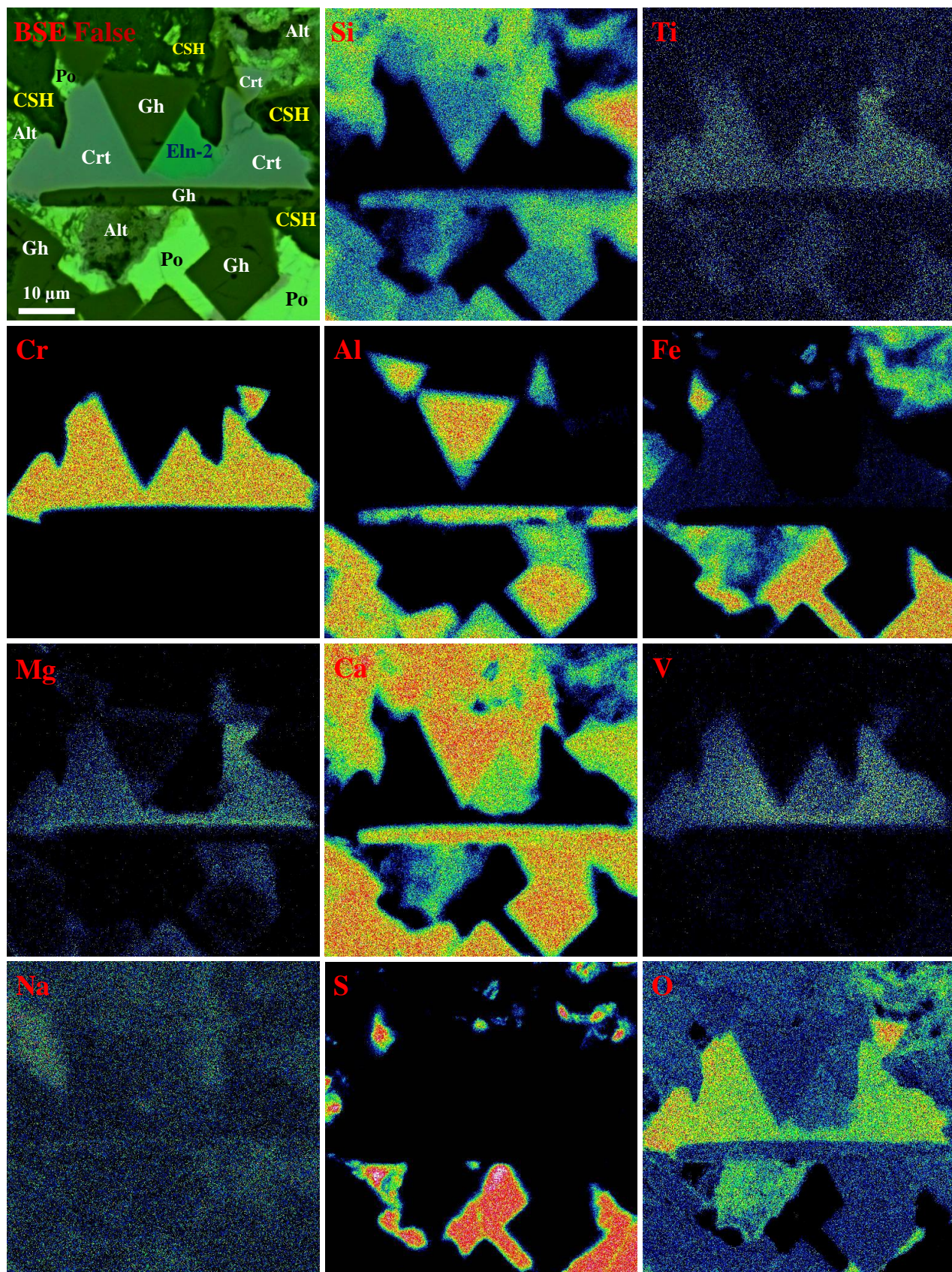


Figure S3. Elemental maps for association with the ellinaite-2 grain from gehlenite-rankinite paralava, Hatrurim Basin, Israel. Symbols: Eln-2 – ellinaite; Po – pyrrhotite; Gh – gehlenite; Crt – chromite-magnesiochromite; CSH – hydrated calcium silicates; Alt – alteration products after pyrrhotite. See Figure 3B for details.

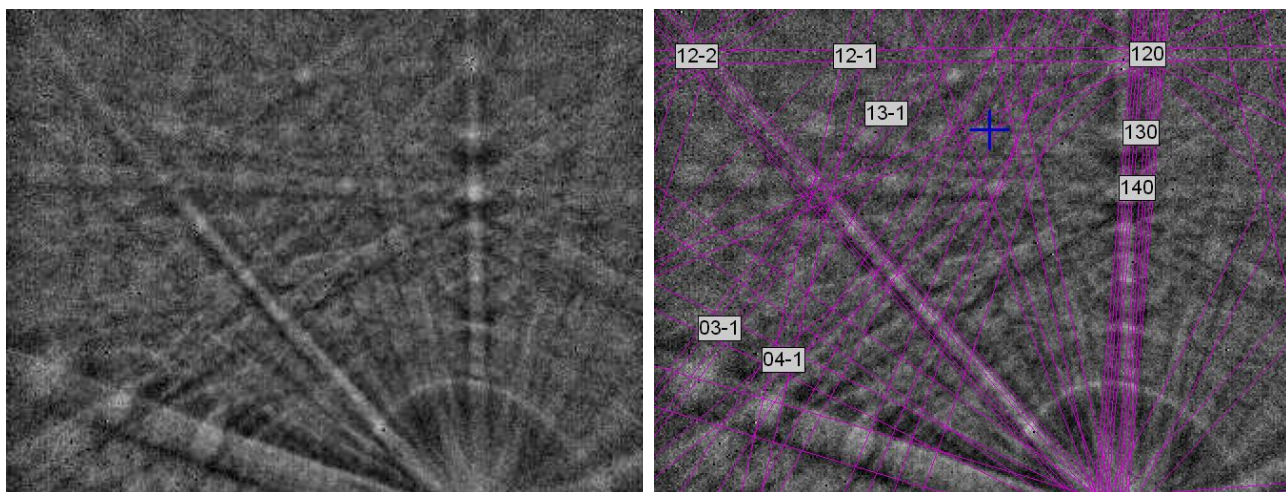


Figure S4. Electron backscattered diffraction (EBSD) pattern and the forced Kikuchi pattern for the ellinaite-1 grain from Hatrurim Basin, Israel (see Figures 2, 3, 6 and S2). The structural data for synthetic β - CaCr_2O_4 (Damay *et al.*, 2010) were used for the Kikuchi pattern simulation. Detector distance – 20 mm. The crystal structure of α - CaCr_2O_4 (Pauschand and Müller Buschbaum, 1975) was also used for comparison.

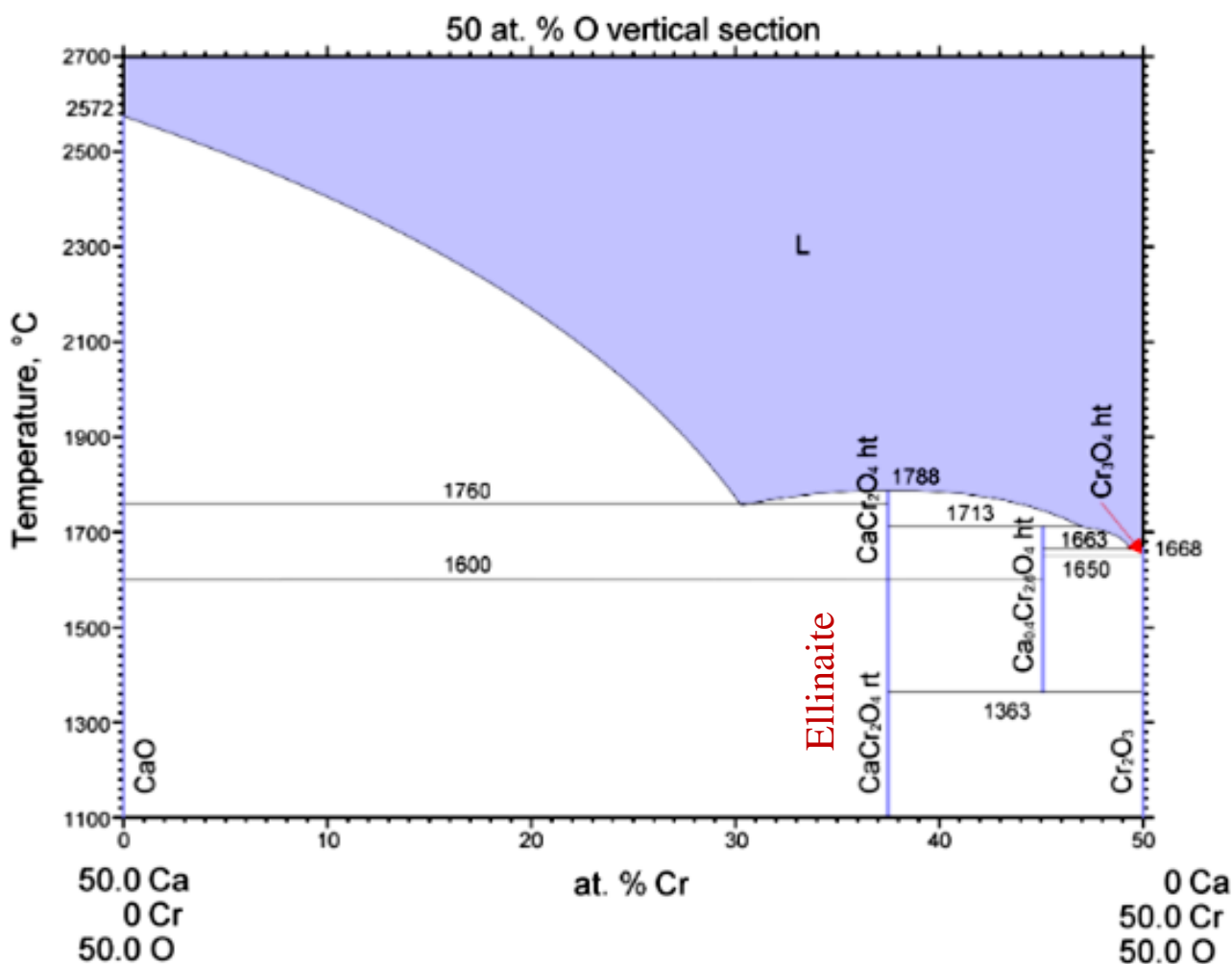


Figure S5. The phase diagram for the system $\text{CaO}-\text{Cr}_2\text{O}_3$ (adapted from Degterov and Pelton, 1996). The phase transition between α - CaCr_2O_4 (ht) and β - CaCr_2O_4 (rt, ellinaite) is near 1600°C.