Metal-silicate partitioning of Co, Ni, V, Cr, Si, and O up to 100 GPa and 5500 K

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During core formation, accreted smaller bodies equilibrated with the proto-Earth. Comparisons between mantle siderophile element concentrations and experimentally measured metal–silicate partition coefficients allow constraints on the time-integrated conditions of core–mantle equilibration. Metal–silicate partitioning has been studied extensively in the multi-anvil press, but very few studies extend to pressures above ~25 GPa. Here, we measure the metal-silicate partitioning of Co, Ni, V, Cr, Si, and O between Fe-rich alloy and $(Mg,Fe)_2SiO_4$ in a laser-heated diamond anvil cell. Recovered samples were cut into sections ~100 nm thick with a focused ion beam. Chemical analyses were performed using energy dispersive X-ray spectroscopy and electron energy loss spectroscopy in a transmission electron microscope. Analyses were performed on a suite of six experiments from pressures of 25, 31, 43, 57, 58, and 100 GPa and temperatures above the silicate liquidus, up to 5500 K. Our results are generally consistent with recent studies. Some of our experiments contain carbon in the metal, which may help explain discrepancies in literature data on V and Cr. The metal in the experiment from 100 GPa and 5500 K contains 9 wt% silicon and an estimated 8 wt% oxygen.