

Online Materials

Electrical conductivity of metasomatized lithology in subcontinental lithosphere

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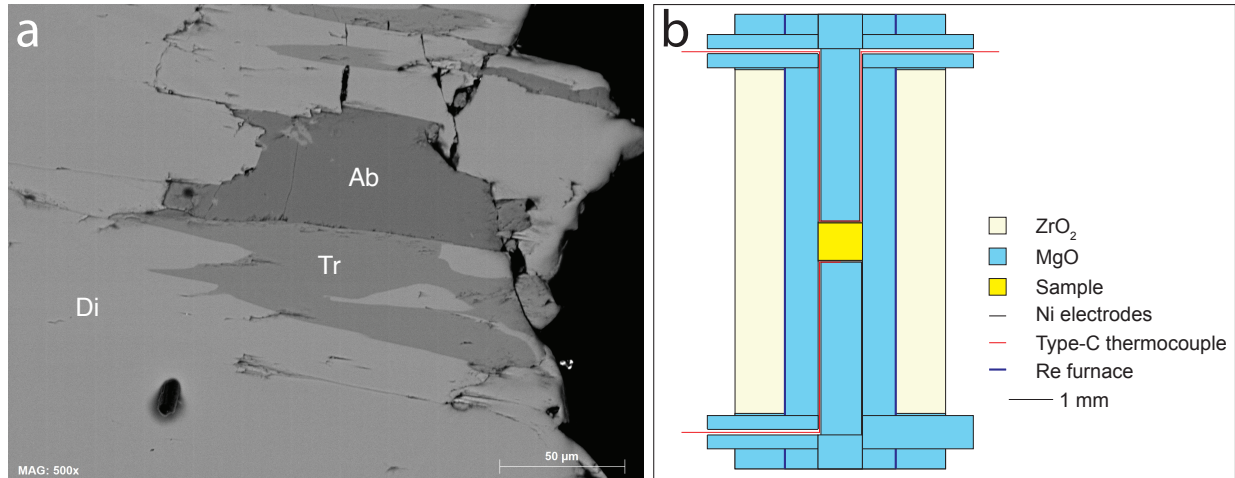


Figure OM1. (a) SEM image of the diopside-tremolite-albite sample before the experiment. The mineral phases are labeled. Abbreviation: Di = diopside, Tr = tremolite, and Ab = albite. (b) Cross-section of the sample assembly for high-pressure and high-temperature electrical conductivity measurements.

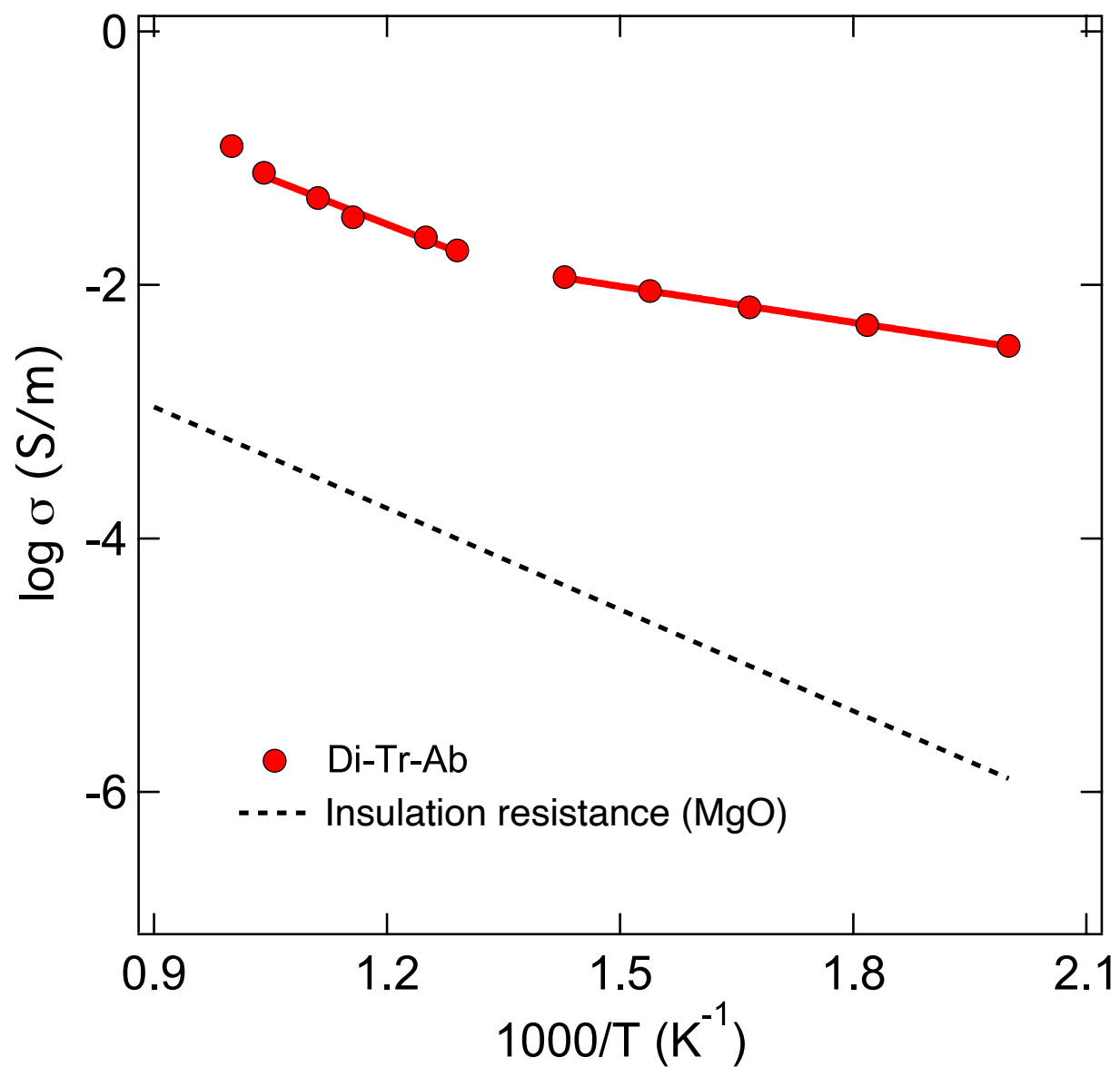


Figure OM2. Comparison between the electrical conductivity of the diopside-tremolite-albite (Di-Tr-Ab) sample and the conductivity (insulation resistance) of the assembly (MgO) as a function of reciprocal temperature.

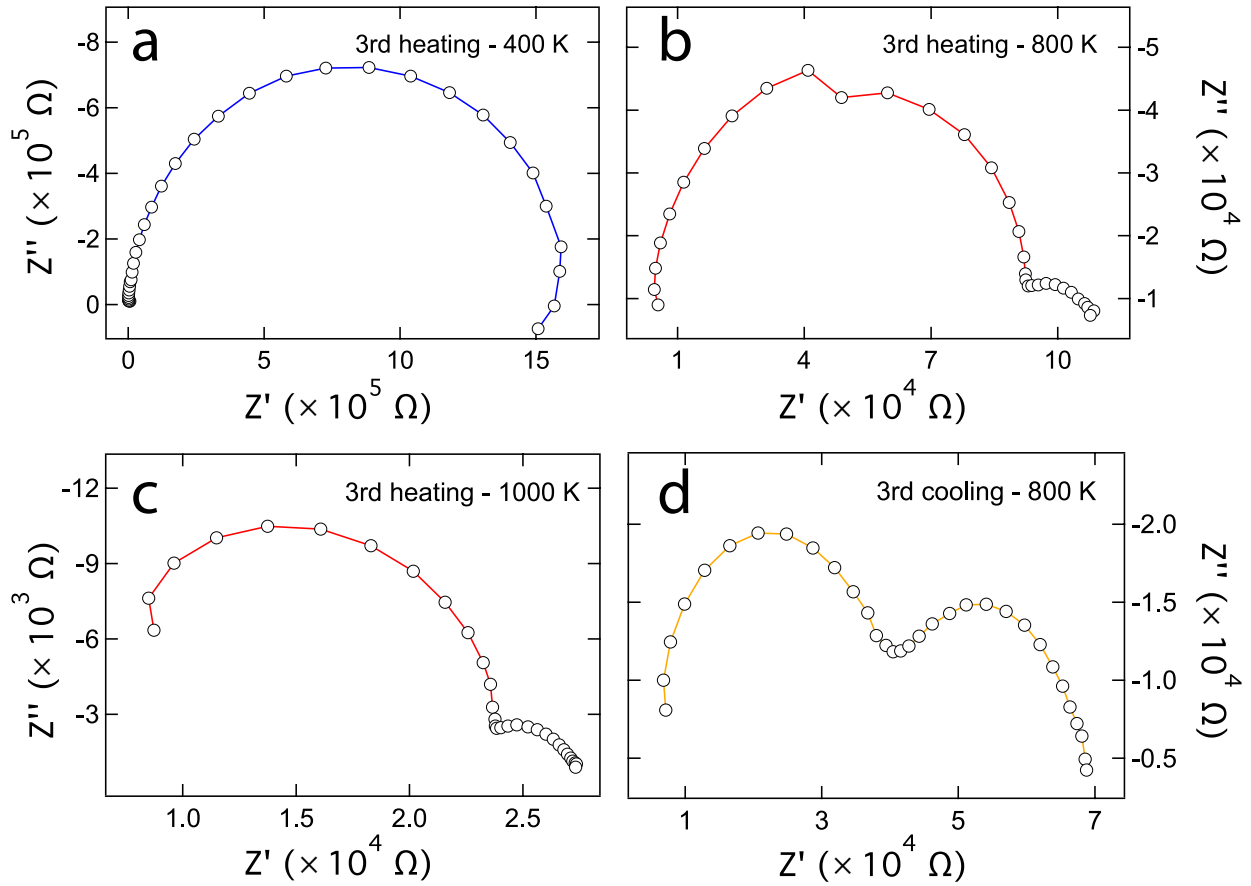


Figure OM3. Cole-Cole plot for the diopside-tremolite-albite sample at 3.0 GPa. The axis represents the real (Z') and imaginary part (Z'') of the complex impedance. **(a)** The sample is in the solid state at 400 K of the 3rd heating path. **(b-c)** The radius of the arc continues to shrink, and an additional arc is observed in the low-frequency range at 800 K and 1000 K of the 3rd heating path. **(d)** The separation of the two arcs is very clear at 800 K of the 3rd cooling path. The separation of the two arcs in panel **(b-d)** possibly indicates two conductive paths, one through the grain interior and the other along the grain boundary. This probably reflects the dehydration of the amphibole-bearing rock sample, which generates two conductive phases at high temperatures, i.e., the original solid phase and the aqueous fluid phase interconnected along the grain boundaries.

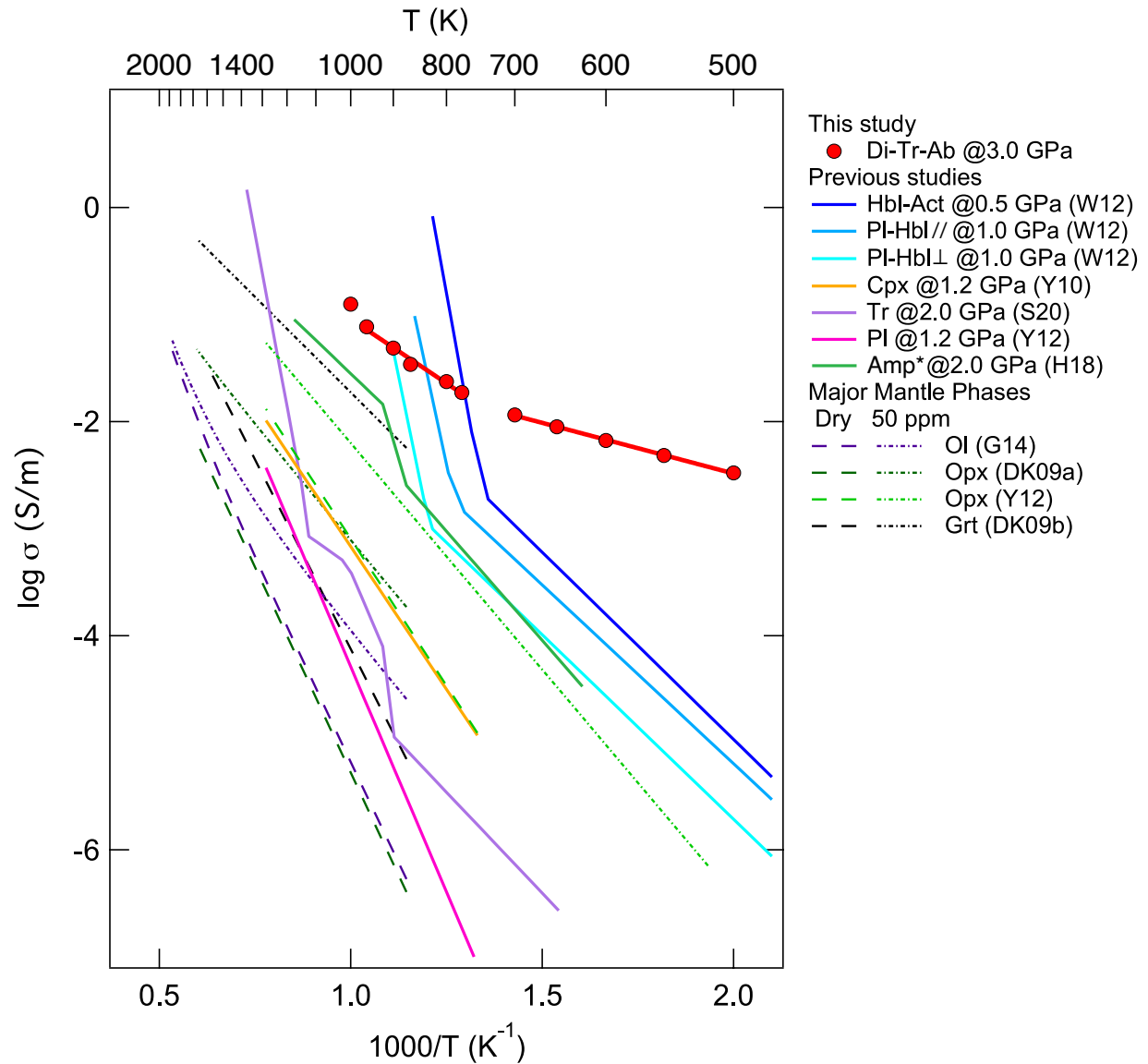


Figure OM4. Plot of electrical conductivity of the diopside-tremolite-albite (Di-Tr-Ab) sample as a function of reciprocal temperature. Note: filled red symbols = data from this study; bold red lines = Arrhenius fit to data from this study; dark blue line = hornblende-actinolite-bearing hornblende (Hbl-Act) (W12 = Wang et al. 2012); intermediate blue line = plagioclase-hornblende-bearing hornblende parallel to the lineation within the sample (Pl-Hbl//); light blue line = plagioclase-hornblende-bearing hornblende perpendicular to the lineation within the sample (Pl-Hbl \perp); orange line = clinopyroxene (Cpx) (Y11 = Yang et al. 2011); purple line = tremolite (Tr) (S20 =

Shen et al. 2020); magenta line = plagioclase (Pl) (Y12 = Yang et al. 2012); green line = amphibole (Amp) (H18 = Hu et al. 2018); thin dashed and dotted lines represent “dry” NAMs and “wet” NAMs with 50 ppm water, respectively: olivine (Ol) (G14 = Gardés et al. 2014), orthopyroxene (Opx) (DK09a = Dai and Karato 2009a; Y12 = Yang et al. 2012), and garnet (Grt) (DK09b = Dai and Karato 2009b).