Melting experiments on the $MgSiO_3$-SiO_2 system to deep lower mantle pressures

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$MgSiO_3$–SiO_2 system is important to understand SiO_2-rich chondritic mantle materials, but its melting phase relations have been determined experimentally only up to 1 GPa. Here we conducted melting experiments in a pressure range from 41 to 139 GPa using a laser-heated diamond-anvil cell (DAC), in order to determine the change in a eutectic melt composition. A cross section at the hot spot of a heated sample was prepared with a focused ion beam (FIB), and its textural and compositional characterizations were made with a SEM/EDS. Quenched molten samples always exhibited a concentric texture, with quenched melt at the center surrounded by liquidus phase(s) of $MgSiO_3$ and/or SiO_2. Our data show that eutectic composition changes with increasing pressure from $SiO_2/(MgO+SiO_2)$ = 0.55 (molar ratio) at 1 GPa (Hudon et al., 2005 J. Petrol.) to ~0.60 at 41 GPa and further to ~0.65 at 135 GPa. Combining with the results on the MgO–$MgSiO_3$ system (Ozawa et al., this meeting), we discuss a large-scale differentiation in chondritic mantles starting from a wide range of MgO/SiO_2 ratios.

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