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# Melting relation on FeO-SiO2 system at high pressure and the fate of the subducted banded iron formations

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Subduction of banded iron formations (BIFs) may have played a significant role on the evolution of the core-mantle boundary (CMB) region and the chemical stratification at the topmost core. Almost all of the BIFs that had been deposited on the seafloor must have been subducted into the mantle and only a small portion was left at the surface today. Because of their high density, BIFs may have fallen down toward the CMB region. The amount of subducted BIFs is estimated to be $2*10^8$ $km^3$, which roughly matches with the total volume of the ultra-low velocity zones (Dobson and Brodholt, 2005, *Nature*). BIFs would be composed mainly of FeO and $SiO_2$ in the lower mantle because its oxidation state is close to iron-wustite buffer. We have performed melting experiments on FeO-$SiO_2$ system by laser-heated diamond-anvil cell technique at 25 - 140 GPa. FE-EPMA and FIB-SEM chemical analysis and observation of the texture of the recovered samples revealed that the liquidus phase was $SiO_2$ when starting from $Fe_2SiO_4$ fayalite, and compositions of the quenched melt suggested that the composition of the eutectic point was extremely FeO-rich ($<$0.6 wt% $SiO_2$). The solidus curve was constrained by observing the existence or no-existence of tiny quenched melt pools in each recovered samples. The solidus temperature at CMB pressure was 3,100 to 3,300 K that were lower than the solidus of pyrolite and the geotherm (Nomura et al., 2014, *Science*). These results imply that when the BIFs reach the CMB, they generate FeO-rich liquid that would be mixed with the basal magma ocean (Labrosse et al., 2007, *Nature*). This liquid would form a thin layer spread along CMB and react with the topmost core. Silicon content in liquid iron varies inversely to the oxygen fugacity when equilibrium with silicate melt (Ricolleau et al., 2011 *EPSL*). Assuming silicon-rich bulk core, exchange of silicon and oxygen would occur between the topmost core and FeO-rich silicate melt. This mechanism may account for the seismic wave speed anomaly observed at the topmost core which is thought to be honor to chemical stratification (Helffrich and Kaneshima, 2010 *Nature*; Buffett and Seagle, 2010 *JGR*).