The silicon isotope composition of three carbonaceous chondrites (Orgueil, Murchison, and Vigarano), three ordinary chondrites (Parnallee, Bovedy, Bremer vörde), one enstatite chondrite (Sahara 97158) and nine terrestrial samples (7 peridotites, 1 mid-ocean ridge basalt, 1 ocean island basalt) were measured to high precision and accuracy using the high resolution Nu Plasma 1700 MC-ICPMS at ETH Zurich. Silicon isotope ratios were analyzed by sample-standard bracketing against the NBS28 standard. The meteorite samples cover a narrow range from $\delta^{30}\text{Si} = -0.52 \pm 0.05\%$ for Sahara 97158 (EH3) to $\delta^{30}\text{Si} = -0.35 \pm 0.04\%$ for Orgueil (CI). The terrestrial samples range from -0.32 to -0.24‰. Based on the mean of our measured terrestrial samples, the Si isotope composition of the bulk silicate Earth is -0.28 $\pm$ 0.03‰ (1 SD), that is 0.08$\pm$0.04‰ heavier than our carbonaceous chondrites. We interpret this small difference in Si isotope composition as a result of the incorporation of Si into the Earth’s core during core formation in a deep magma ocean, which is consistent with temperatures and pressures required to account for siderophile element abundances in the Earth’s mantle [e.g. 1]. Among chondrites, we observe a correlation of the Si isotope compositions for the measured chondrites with their elemental Mg/Si ratios. This feature differs from previously reported data where carbonaceous and ordinary chondrites were indistinguishable within error [2]. The cosmochemical trend in Mg/Si has been explained by several processes. Given that these processes are expected to induce kinetic isotope fractionation of silicon, one can test these hypotheses at least qualitatively: (i) in the case of fractional condensation [3] starting from a solar composition ($\approx$ CI), the first material to condensate (olivine) should be enriched in light isotopes. If an olivine-rich component is lost, then the residual enstatite-rich component should have a high $\delta^{30}\text{Si}$, in contrast with what is observed for enstatite and ordinary chondrites; (ii) the preferential evaporation of forsterite [4] should lead to lower Mg/Si with a residue enriched in heavy isotopes, which is not observed; (iii) the reaction of olivine with a SiO-rich vapor to form enstatite [5] if affected by kinetic isotope fractionation should lead to a low Mg/Si and a low $\delta^{30}\text{Si}$ in the reaction product. Thus, among the three proposed hypotheses, only the latter seems to fit with our Si isotope observations.

In contrast with our meteorite data, the terrestrial samples do not show a resolvable trend in a $\delta^{30}\text{Si}$ versus Mg/Si ratios, suggesting that magmatic processes do not fractionate substantially silicon isotopes. It is interesting to note that the silicon composition of our terrestrial basalts is consistent with that of BHVO-1 and BHVO-2 measured by [6].