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Determining the titanium isotope composition of single chondrules from the Allende meteorite

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Isotope anomalies in meteoritic matter are a powerful tool for studying stellar nucleosynthesis, planetary genetics, and the processes affecting solid material in the solar protoplanetary disk. Here we use Ti isotope anomalies measured in single chondrules to constrain the genetic relations of chondrules within a given chondrite, as well as among different chondrite groups, with the ultimate goal to better constrain chondrule formation and disk mixing models. Thus far, we have set up the analytical procedures to separate small amounts of Ti (<400 ng) by ion-exchange chromatography and measure them by MC-ICPMS at a precision of ~0.1 ε^{50}Ti (95% c.i.). Titanium isotope data for a first set of Allende chondrules will be presented at the meeting. Since the Ti yield of the chemistry is ~100%, we also obtain mass-dependent isotope data using sample-standard-bracketing. The combination of mass-independent and mass-dependent Ti isotope variations may provide important information about disk processing and more generally, the origin of nucleosynthetic isotope anomalies.

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