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Abstract

We are developing an in-situ, rock-dating spectrometer for spaceflight called the Chemistry, Organics, and Dating EXperiment (CODEX). CODEX will measure Rb-Sr ages on the Moon or Mars, and can be augmented to obtain Pb-Pb ages. Coupling Rb-Sr and Pb-Pb measurements broadens the suite of samples that can be dated, and could provide tests of concordance. Here we assess whether geochronologically meaningful Pb-Pb data could be measured in situ by tuning the prototype CODEX to acquire Pb-Pb data from a suite of well-characterized specimens from the Earth, Moon, and Mars. For Keuhl Lake zircon 91500 our $^{207}Pb/^{206}Pb$ age of 1090 ± 40 Ma is indistinguishable from the accepted age. In each of the Martian meteorites we studied, we could not resolve more than a single component of Pb, and could not uniquely determine ages. Nevertheless, our measurements were consistent with most previous studies of Pb in these meteorites. On the other hand, we determined $^{204,206,207}Pb$ isochron ages for all three lunar meteorites we studied. Our age for MIL 05035 is 3500 ± 200 Ma, within 2σ of published ages for this specimen, in spite of its having <1 ppm Pb. LAP 02205 was contaminated by terrestrial Pb, but by filtering our data to exclude the most contaminated spots, we obtained an age of 3010 ± 70 Ma, coincident with published values. Finally, our age for NWA 032 is nearly 1000 Myr older than its age determined from other isotopic systems, and is supported by additional Pb measurements made after chemical leaching.