

**Table S4 Summary of error components and resulted density errors of solid samples**

Sample	Run	Diameter error [%]	Height error [%]	$\rho$ error from length errors [%]	$\rho$ error from rotation error [%]	Total $\rho$ error [%]
Sn	AK11	0.001–0.002	0.002–0.036	0.002–0.005	0.177–0.181	0.181–0.184
	AK14	0.001–0.002	0.001–0.006	0.003–0.006	0.177–0.181	0.182–0.222
Ni	AK12	0.005–0.041	0.271–0.322	0.283–0.324	0.153–0.157	0.440–0.479
	AK13	0.005–0.041	0.075–0.076	0.076–0.111	0.150–0.157	0.233–0.267
Fe	AK15	0.058–0.251	0.049–0.276	0.239–0.573	0.167–0.170	0.408–0.741
	AK16	0.003–0.026	0.002–0.003	0.007–0.051	0.266–0.281	0.300–0.331
	AK18	0.001–0.003	0.001–0.004	0.001–0.007	0.107–0.115	0.109–0.119
	AK19	0.002–0.007	0.001–0.025	0.004–0.027	0.132–0.135	0.137–0.162