

Supporting information for the manuscript submitted to *American Mineralogist* entitled,

“Pb in Zircon at the Atomic Scale”

Masashi Kogawa, E. Bruce Watson, Rodney C. Ewing and Satoshi Utsunomiya

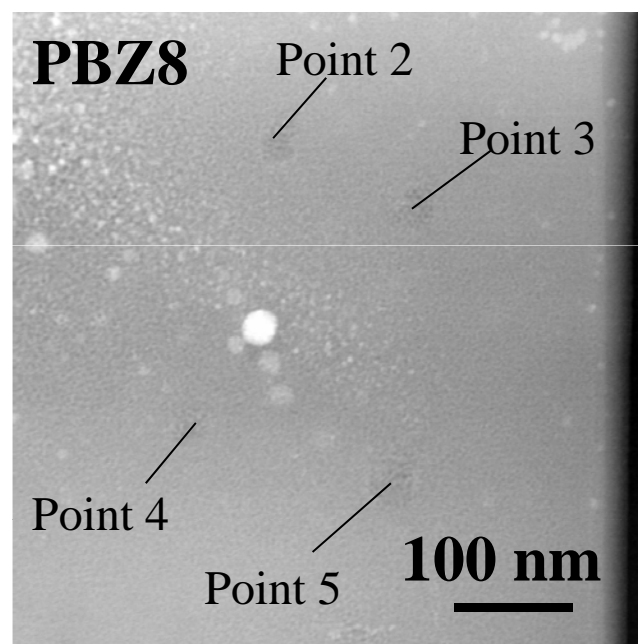
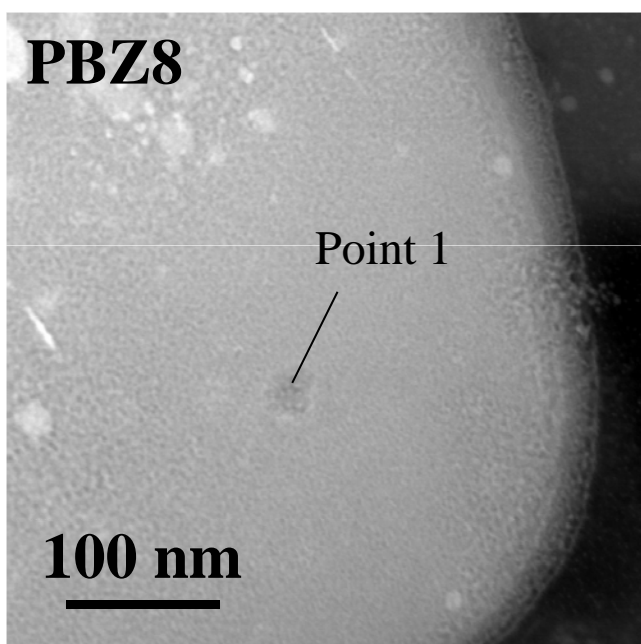
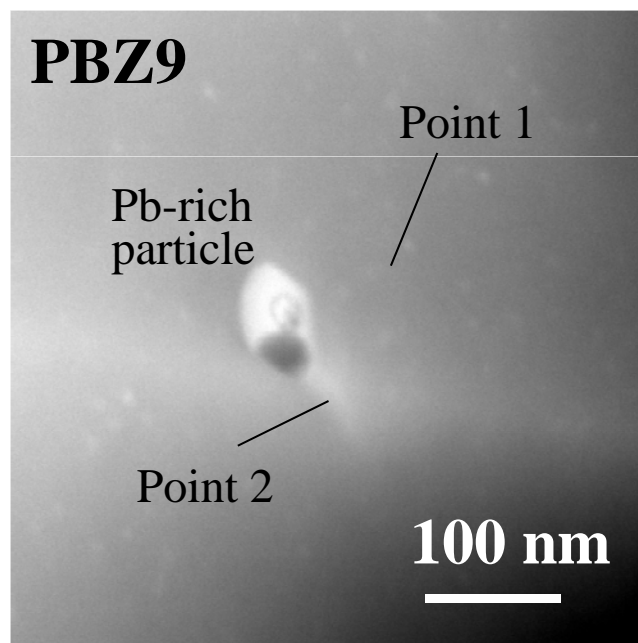
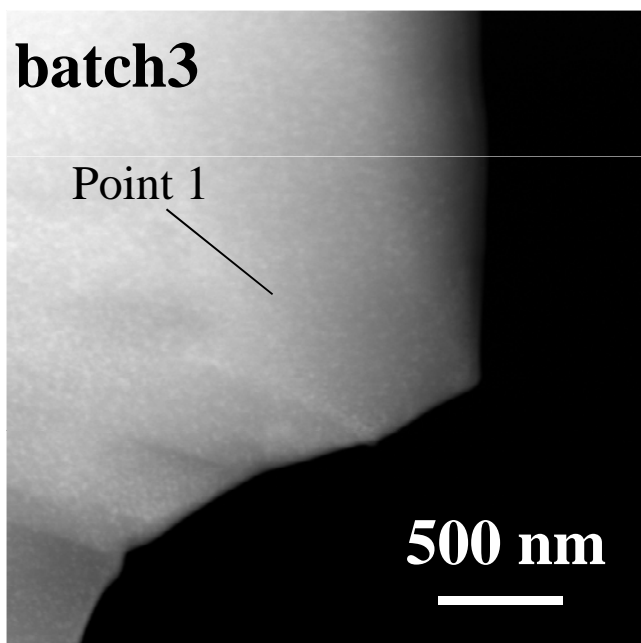


Figure S1. HAADF-STEM images of batch3, PBZ9 and PBZ8 zircon showing the area of the STEM-EDX point analysis for 10 min. of acquisition.

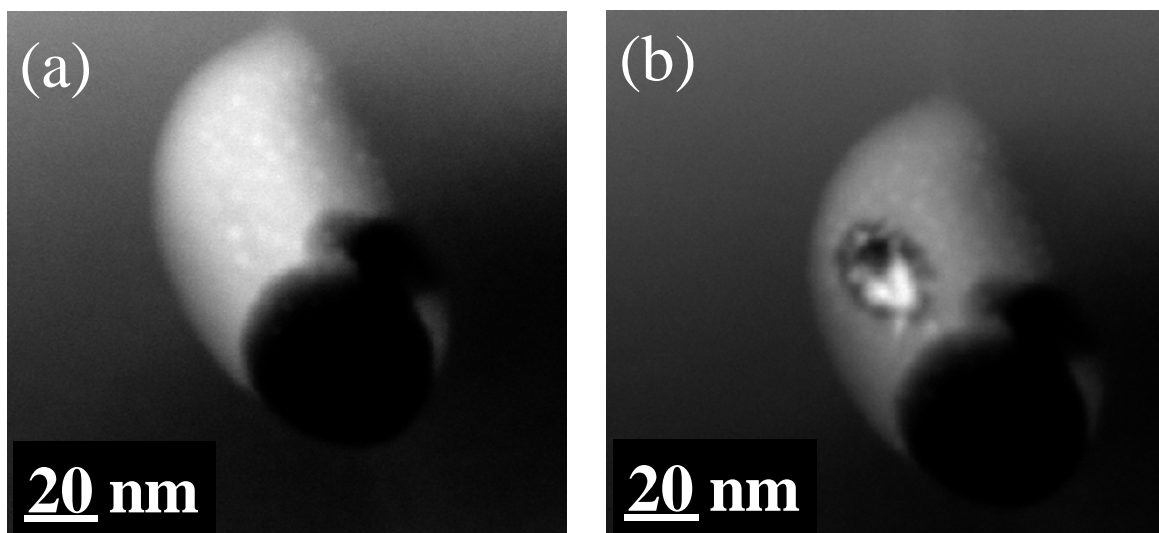


Figure S2. HAADF-STEM images of Pb-rich particle in batch3 (a) and the particle after electron-beam damage (b), revealing that Pb particle is sensitive to the electron beam.

TABLE S1. The each result of electron microprobe analysis (EMPA) of 36 PBZ8 zircon grains. The concentrations are given in oxides and the number of atoms (N.O.A.) was calculated in terms of tetroxide. The P/Pb indicates their molar ratio.

Zircon	wt. %					N.O.A. (O = 4)				
	SiO ₂	ZrO ₂	PbO	P ₂ O ₅	Total	Si	Zr	Pb	P	P/Pb
Grain1	37.0	58.8	1.7	1.0	98.5	1.104	0.856	0.014	0.026	1.9
Grain2	41.8	55.3	1.0	0.7	98.8	1.200	0.773	0.008	0.018	2.3
Grain3	40.5	57.2	1.1	1.0	99.8	1.163	0.801	0.009	0.025	2.8
Grain4	38.4	58.1	2.0	1.0	99.4	1.129	0.833	0.016	0.024	1.5
Grain5	33.9	63.3	1.6	0.9	99.7	1.028	0.937	0.013	0.023	1.8
Grain6	40.1	56.5	0.7	1.0	98.3	1.164	0.801	0.006	0.025	4.2
Grain7	41.1	55.0	1.3	1.1	98.6	1.186	0.775	0.010	0.027	2.7
Grain8	36.1	59.1	2.0	1.1	98.4	1.088	0.868	0.017	0.028	1.6
Grain9	32.0	63.2	3.4	1.0	99.5	0.994	0.958	0.028	0.027	1.0
Grain10	34.4	61.5	2.1	1.2	99.3	1.043	0.909	0.017	0.032	1.9
Grain11	39.8	57.1	1.9	1.0	99.8	1.154	0.808	0.015	0.025	1.7
Grain12	35.6	60.5	1.8	1.3	99.2	1.067	0.884	0.014	0.034	2.4
Grain13	34.9	62.0	1.0	0.9	98.7	1.053	0.913	0.008	0.024	3.0
Grain14	32.9	63.6	2.6	1.1	100.2	1.005	0.948	0.021	0.029	1.4
Grain15	36.7	58.4	2.0	1.0	98.1	1.103	0.856	0.016	0.026	1.6
Grain16	38.9	55.9	1.9	1.2	97.8	1.149	0.806	0.015	0.030	2.0
Grain17	35.1	61.4	2.0	1.3	99.9	1.053	0.897	0.016	0.033	2.1
Grain18	35.8	61.3	1.4	1.3	99.8	1.066	0.889	0.011	0.032	2.9
Grain19	35.9	59.4	1.5	1.4	98.2	1.081	0.870	0.012	0.034	2.8
Grain20	46.8	49.6	1.0	0.5	97.9	1.307	0.675	0.007	0.012	1.7
Grain21	40.8	58.1	1.0	0.6	100.5	1.168	0.810	0.007	0.015	2.1
Grain22	42.9	54.8	0.9	0.5	99.1	1.220	0.761	0.007	0.012	1.7
Grain23	41.4	56.5	0.9	0.5	99.3	1.189	0.792	0.007	0.012	1.7
Grain24	36.8	60.2	1.6	1.3	99.9	1.087	0.867	0.013	0.032	2.5
Grain25	37.2	58.0	1.9	1.3	98.4	1.108	0.842	0.015	0.034	2.3
Grain26	36.5	60.8	1.2	1.3	99.8	1.079	0.877	0.010	0.032	3.2
Grain27	45.4	51.0	0.9	1.1	98.5	1.267	0.695	0.007	0.027	3.9
Grain28	35.7	60.7	1.2	1.5	99.2	1.064	0.883	0.010	0.039	3.9
Grain29	42.5	54.7	1.3	1.1	99.6	1.205	0.756	0.010	0.027	2.7
Grain30	36.7	58.8	2.3	1.6	99.4	1.090	0.852	0.019	0.039	2.1
Grain31	33.8	61.3	1.8	1.4	98.4	1.033	0.913	0.015	0.037	2.5
Grain32	36.0	60.4	1.9	1.7	100.0	1.067	0.872	0.015	0.042	2.8
Grain33	38.8	60.3	0.8	0.7	100.6	1.123	0.851	0.006	0.018	3.0
Grain34	37.8	61.4	1.2	0.8	101.2	1.100	0.871	0.009	0.019	2.1
Grain35	36.7	61.0	1.6	1.1	100.4	1.083	0.877	0.013	0.026	2.0
Grain36	35.0	59.5	2.7	1.4	98.7	1.063	0.881	0.022	0.035	1.6
Average	37.8	58.7	1.6	1.1	99.3	1.113	0.846	0.013	0.027	2.3
σ	3.4	3.2	0.6	0.3		0.072	0.065	0.008	0.734	