

Supporting information

Figure S-1 *In-situ* U–Pb ages of bastnasite K-9 calibrated by xenotime XN01 using a spot size of 24 μm and without adding nitrogen.

Figure S-2 *In-situ* U–Pb ages of bastnasite K-9 calibrated by xenotime XN01 using a spot size of 32 μm and without adding nitrogen.

Figure S-3 *In-situ* Th–Pb ages of bastnasite K-9 calibrated by xenotime XN01.

Figure S-4 *In-situ* U–Pb ages of four typical bastnasite samples using K-9 as the primary standard in three normal ablation settings by LA-SF-ICP-MS.

Figure S-5 *In-situ* Th–Pb ages of four typical bastnasite samples using K-9 as the primary standard in three normal ablation settings by LA-SF-ICP-MS.

Table S-1 Mathematical equation for U–Pb data correction between standards and samples (xenotime XN01 or concordant bastnasite K-9 as the primary standard)..

Table S-2 U–Th–Pb analytical results of K-9 calibrated by XN01.

Table S-3 U–Th–Pb analytical results of four typical bastnasite samples calibrated by XN01.

Table S-4 U–Th–Pb analytical results of four typical bastnasite samples calibrated by K-9.