

Supporting Information: On the Existence of $\text{AgM}_9(\text{VO}_4)_6\text{I}$ (M = Ba, Pb)

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Synthesis and Characterization of $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ from PbO , V_2O_5 , and AgI .

Stoichiometric amounts of PbO , V_2O_5 , and AgI (9:3:1), respectively, were batched to yield a final reacted composition of $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ and were processed and reacted as reported in the main text. The batched powders were pulverized and mixed as a slurry with isopropanol with an agate mortar and pestle. After drying, the resulting powders were pressed at 2 tonnes into ~ 250 mg, 6mm disk pellets. Pellets were reacted in air in a box furnace or in sealed quartz tubes (10 mm O.D., 8 mm I.D., 180 length) in an alumina tube furnace at 700 °C for 5 hr.

The resulting products were analyzed by PXRD (**Figure S1**), which were comparable to those starting from $\text{Pb}_3(\text{VO}_4)_2$ and AgI . The SEM/EDX analysis of the sectioned portion of the pellet reacted in a sealed quartz tube is presented in **Figure S2**, once again showing the heterogeneous distribution of Ag-I and Pb-V phases.

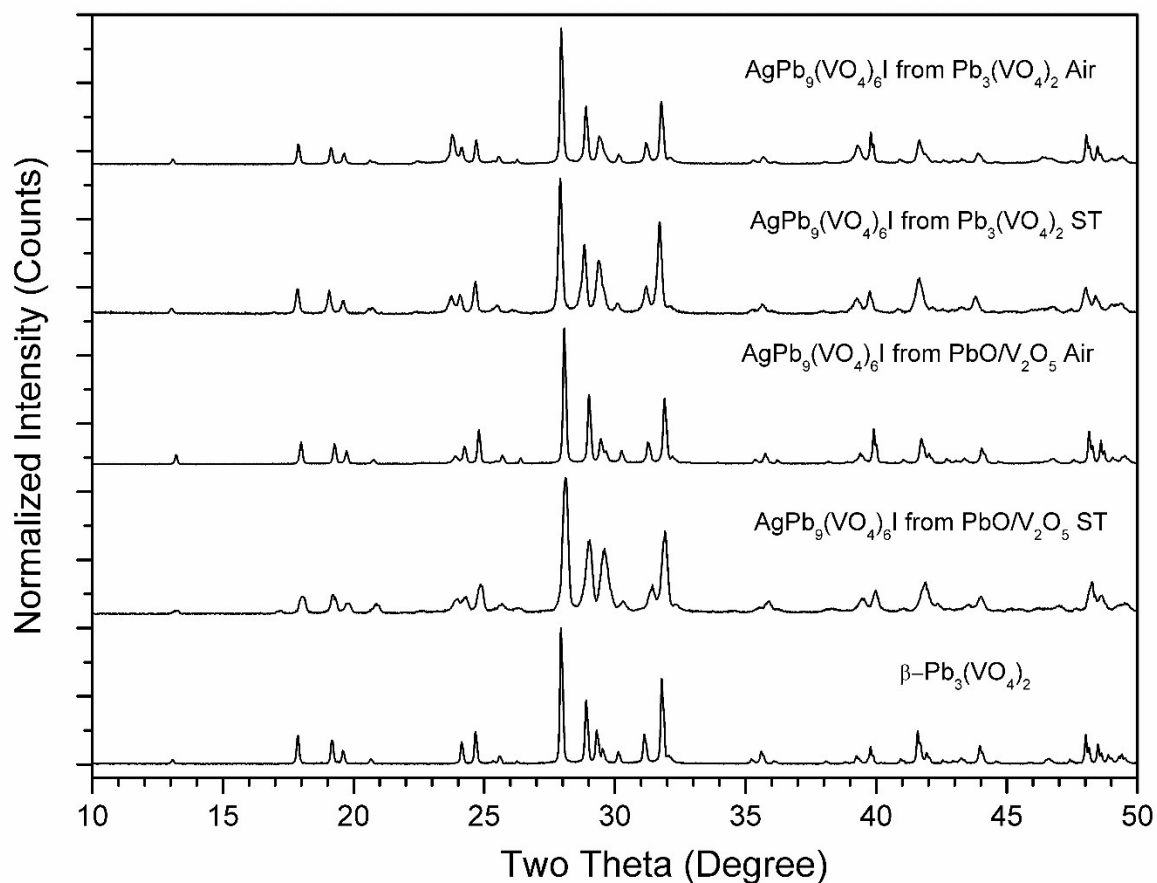


Figure S1. Measured PXRD patterns for “ $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ ” starting from either $\text{Pb}_3(\text{VO}_4)_2$ or PbO and V_2O_5 with AgI reacted at $700\text{ }^\circ\text{C}$ for 5 hr in sealed quartz tubes or in air. The PXRD pattern of $\beta\text{-Pb}_3(\text{VO}_4)_2$ is given for comparison.

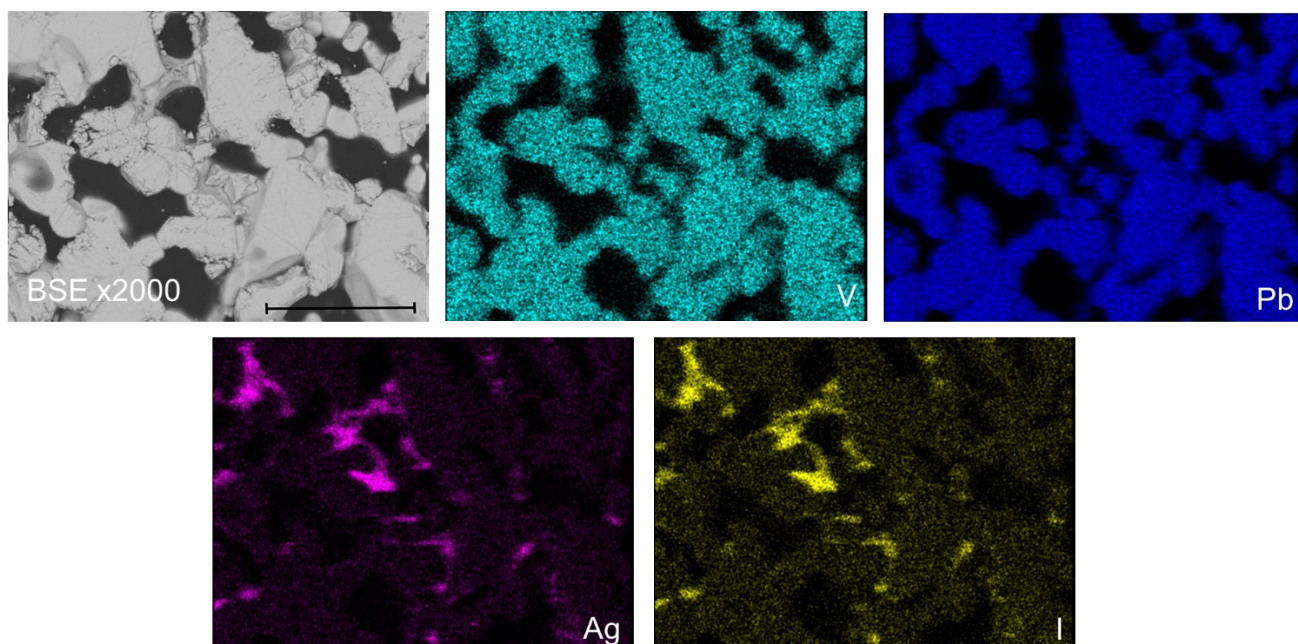


Figure S2. Back-scattering electron (BSE) SEM image at x2000 magnification and EDX map of V (teal), Pb (blue), I (yellow), and Ag (pink) present in $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ produced from PbO , V_2O_5 , and AgI , and reacted at $700\text{ }^\circ\text{C}$ for 5 hr in a sealed quartz tube.

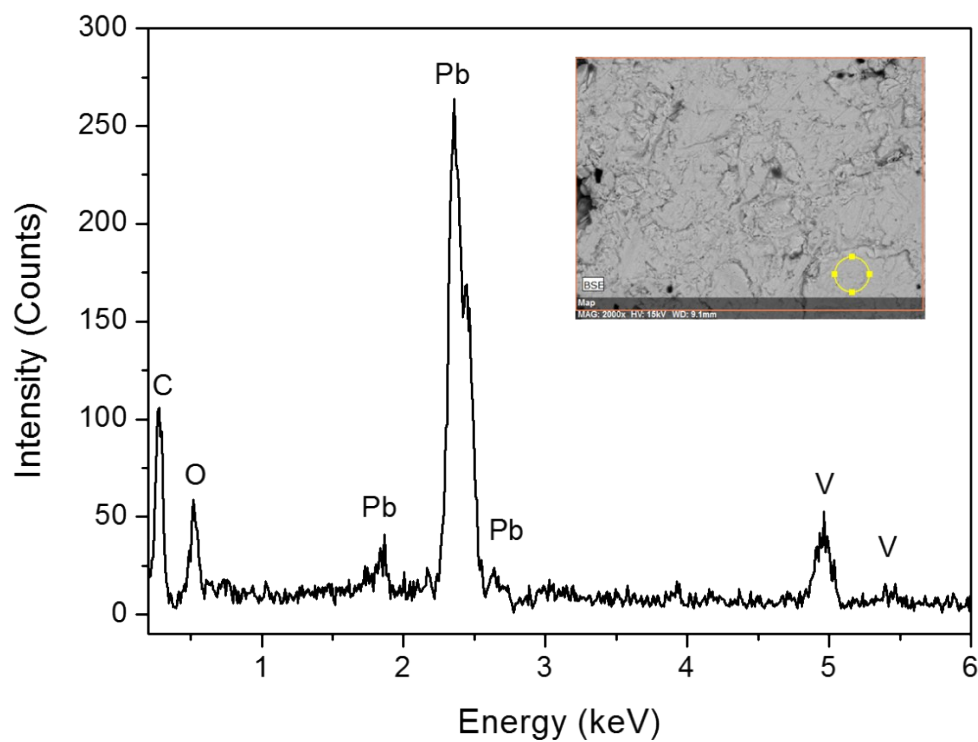


Figure S3. EDX spectrum of spot analyses of the $\beta\text{-Pb}_3(\text{VO}_4)_2$ phase in “ $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ ” reacted at $700\text{ }^\circ\text{C}$ for 5 hr in a sealed quartz tube.

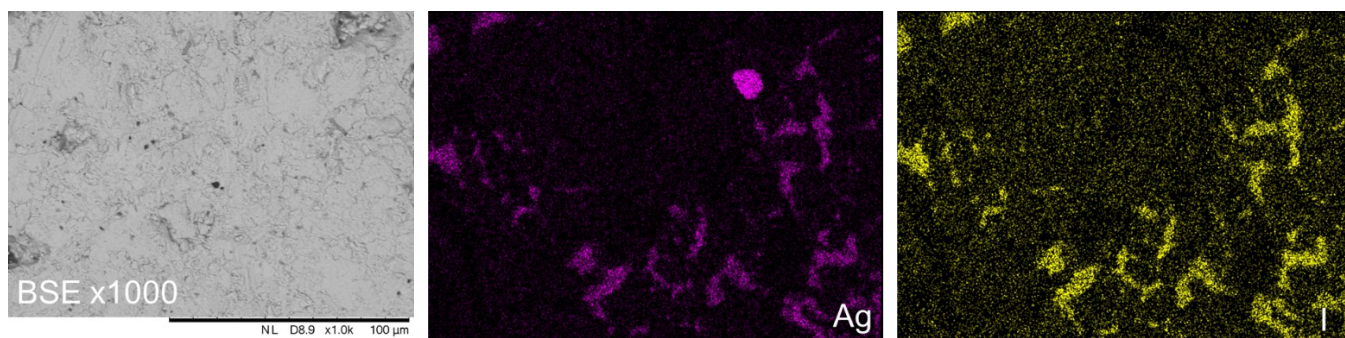


Figure S4. EDX map of Ag (pink) and I (yellow) showing the presence of AgI and Ag metal in “ $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ ” reacted at 700 °C for 5 hr in a sealed quartz tube.

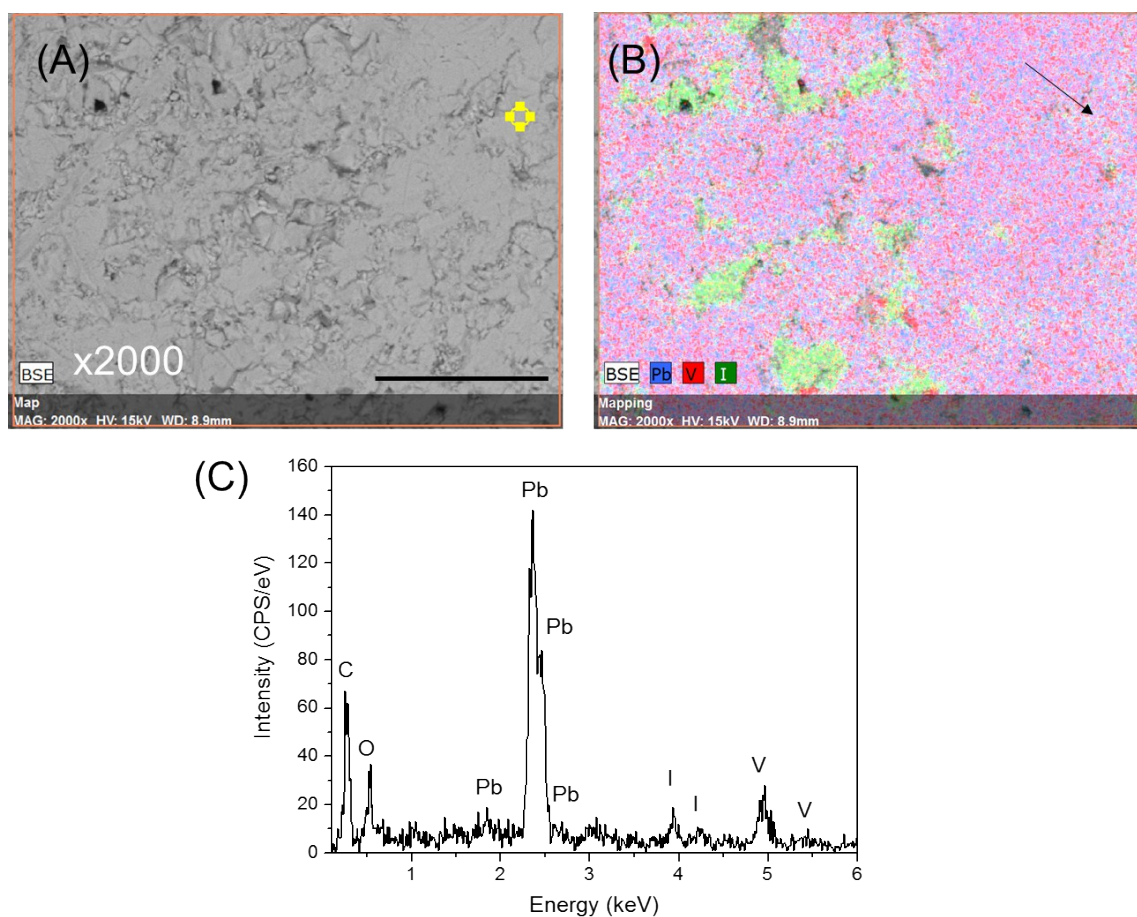


Figure S5. A) BSE image (x2000; scale bar length = 30 μm) showing point of measurement on “ $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ ” reacted at 700 °C for 5 hr in a sealed quartz tube; B) Red-Green-Blue EDX mixed map of Pb (blue), V (red), and I (green) indicating the presence of an overlapping area (white) corresponding to Pb-V-I phase; C) Resulting EDX spectrum of measured point of interest indicating the presence of Pb, V, and I peaks.

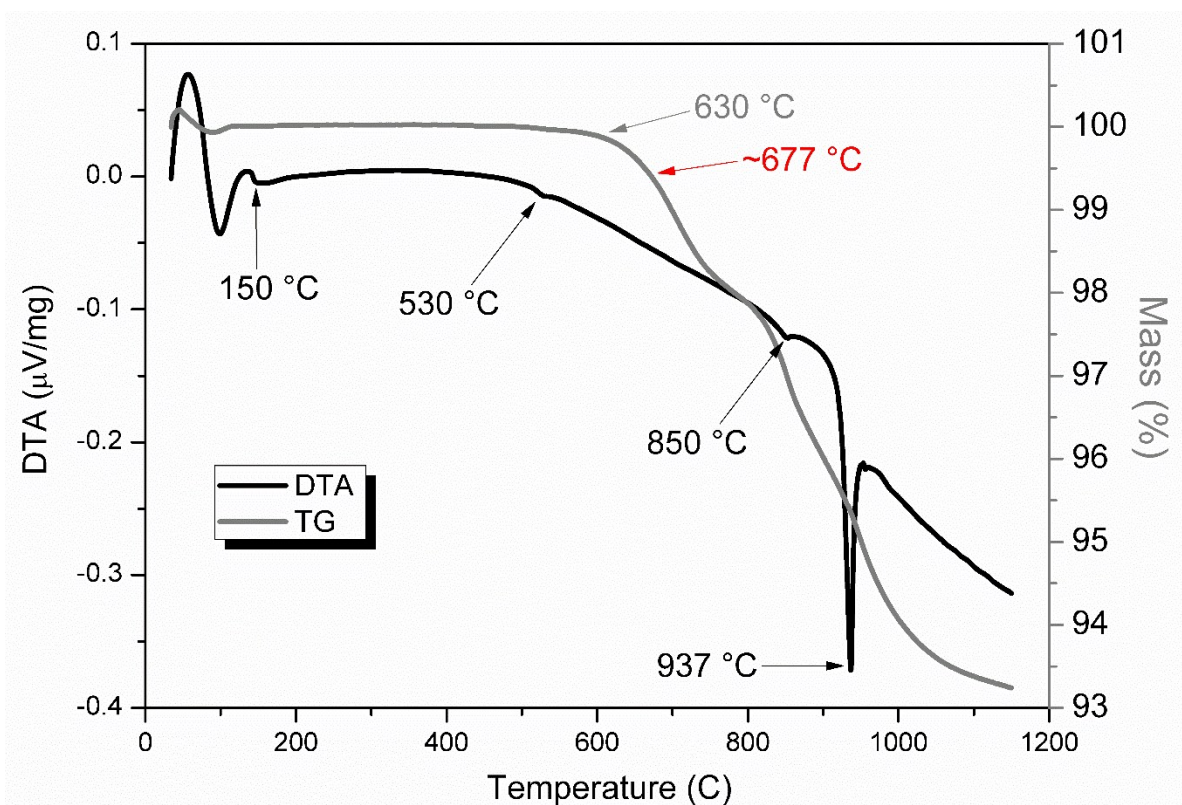


Figure S6. TG-DTA analysis of “ $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ ” reacted at $700\text{ }^\circ\text{C}$ for 5 hr in a sealed quartz tube. Temperature listed in red is the reported decomposition temperature for “ $\text{AgPb}_9(\text{VO}_4)_6\text{I}$ ”.

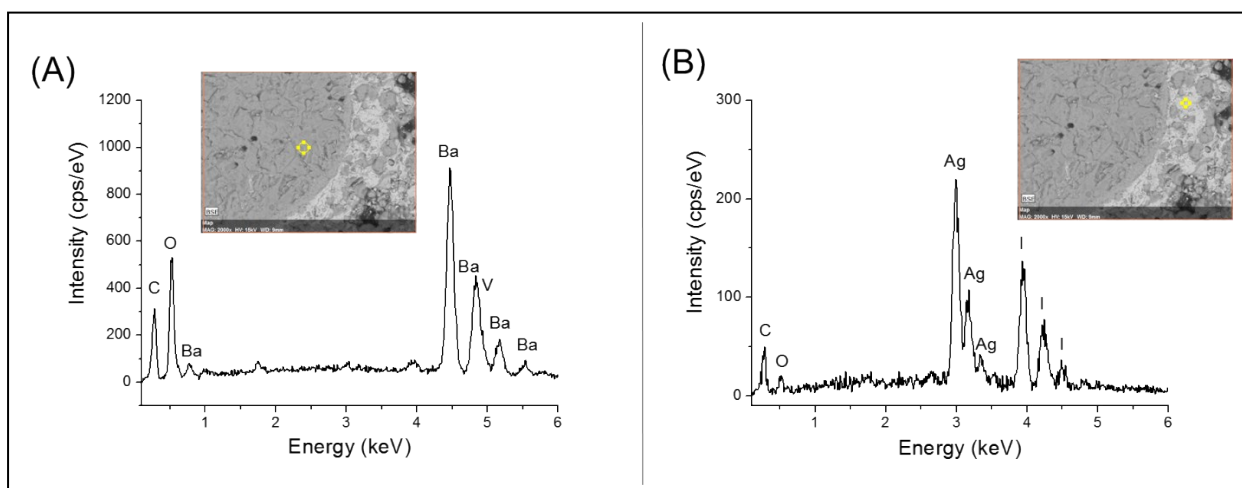


Figure S7. EDX spectra of spot analyses of A) $\text{Ba}_3(\text{VO}_4)_2$ and B) AgI phases in “ $\text{AgBa}_9(\text{VO}_4)_6\text{I}$ ” reacted at $700\text{ }^\circ\text{C}$ for 5 hr in a sealed quartz tube.

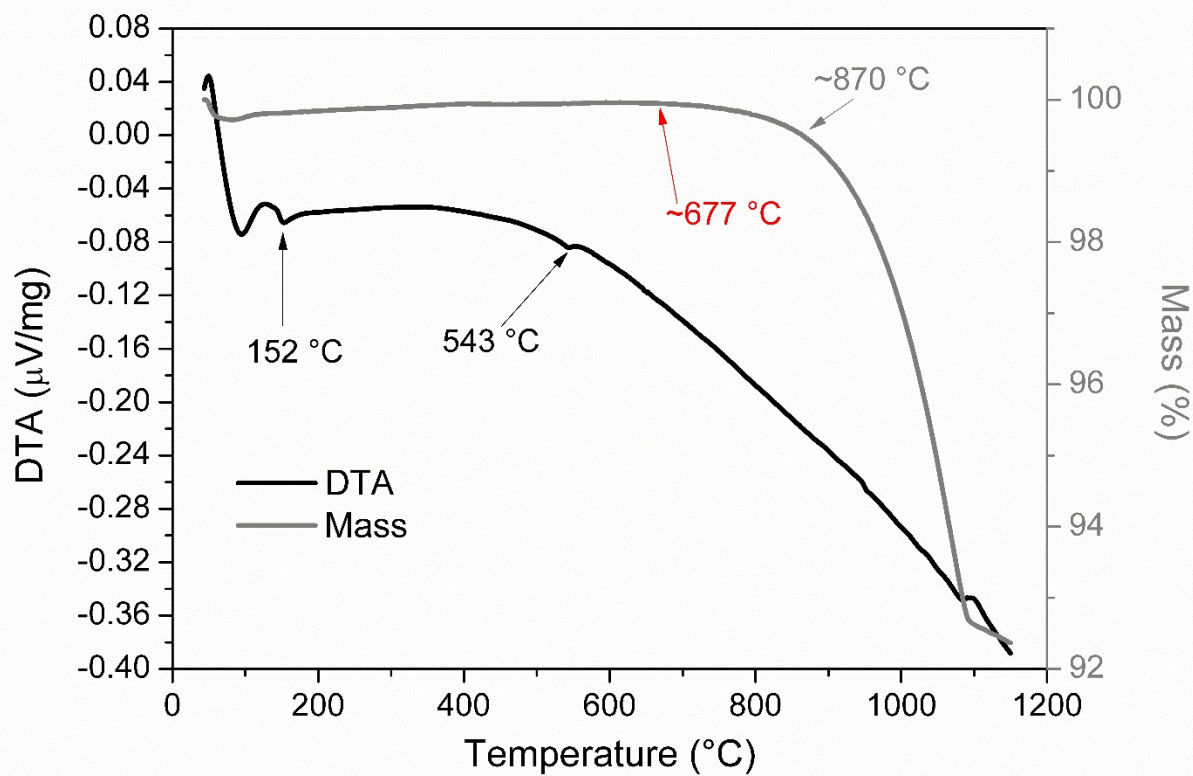


Figure S8. TG-DTA analysis of “ $\text{AgBa}_9(\text{VO}_4)_6\text{I}$ ” reacted at 700 °C for 5 hr in a sealed quartz tube. Temperature listed in red is the reported decomposition temperature for “ $\text{AgBa}_9(\text{VO}_4)_6\text{I}$ ”.

XRD figure from original publication: M. Uno, A. Kosuga, S. Masuo, M. Imamura, S. Yamanaka, J. Alloy Compd., 384 (2004), pp. 300-302.

