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Supporting Information

Low Temperature Activation of Tellurium and Resource-Efficient Synthesis of $AuTe_2$ and Ag_2Te in Ionic Liquids

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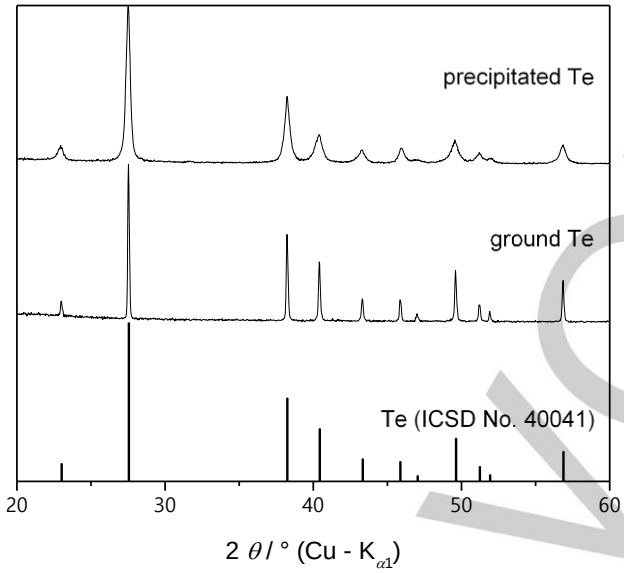

Figure S1. PXRD of with EtOH precipitated Te from reaction solution of $[P_{66614}]Cl$ and Te for 16 h at 200 °C

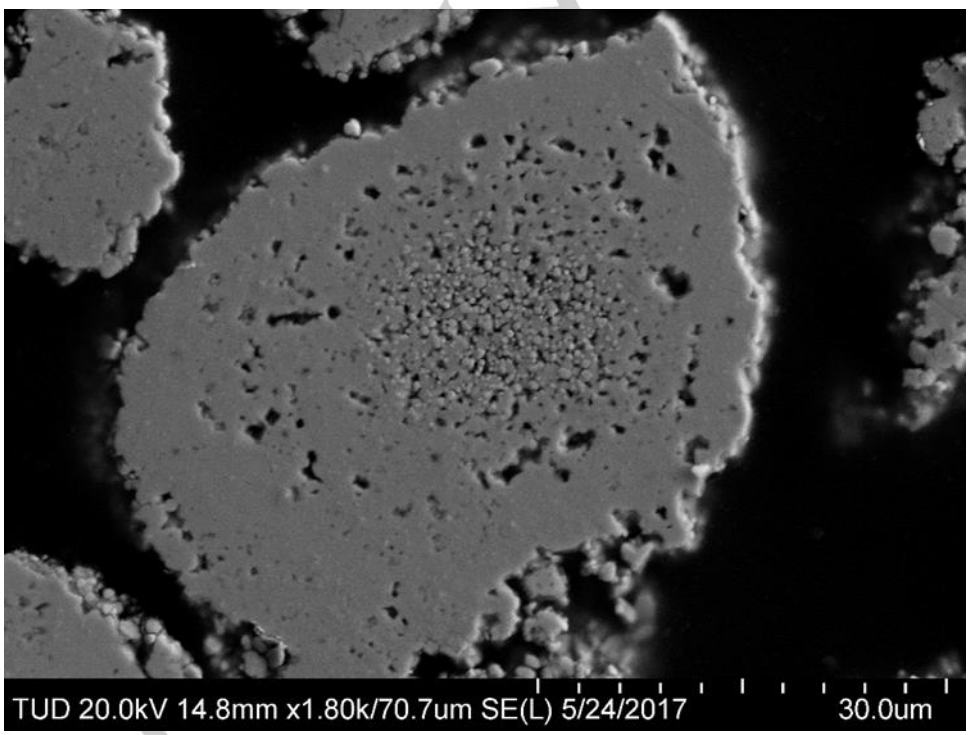

Figure S2. SEM images of a larger particle from the synthesis of Au (0.3 – 0.5 microns) with enclosures of Au in an shell of $AuTe_2$

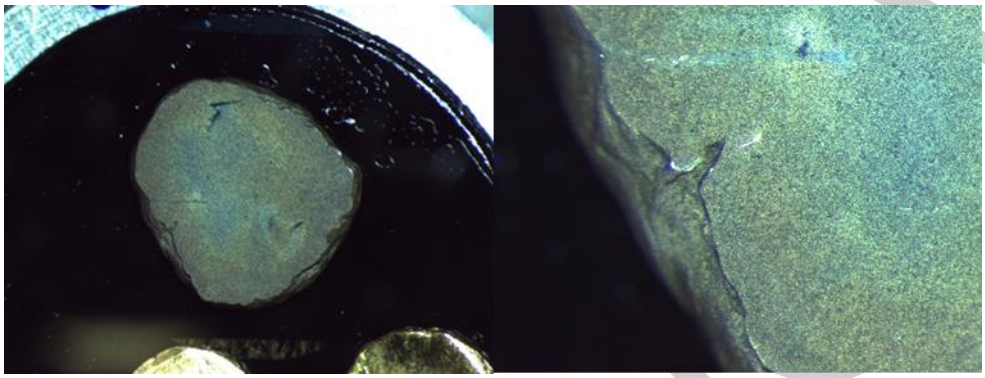

Figure S3. Microscopic picture of a gold flake witch was in contact with Te and $[P_{66614}]Cl$ at 200 °C for 16 h (passivation escperiment), who formed an dark passivation layer of gold telluride (left) and scratched with steal needle (right)

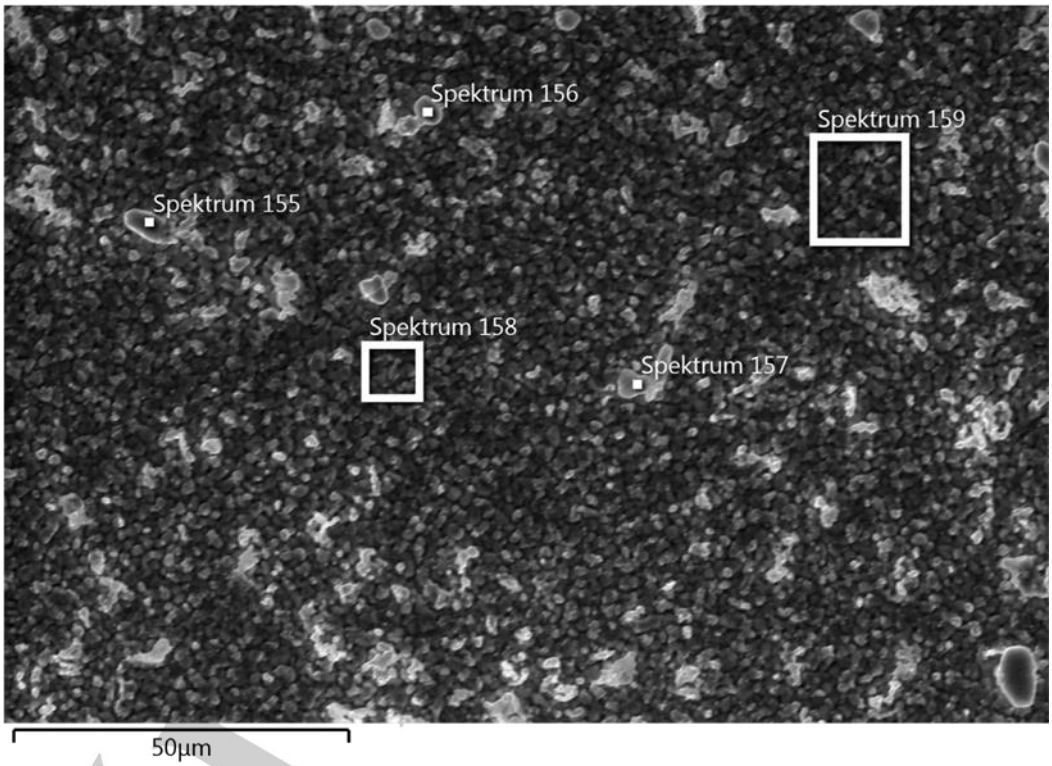

Figure S4. SEM image of the gold flake from S3. Small particles of Te are attached to the surface. EDX spectra were measured at the marked points and mapped over the aria of the sketched windows. The elemental distribution is given in table S1
The spectra of the windows shows $AuTe_2$

Table S1. Elemental distribution determined by EDX at the marked points in figure S4

	Spektrum 155	Spektrum 156	Spektrum 157	Spektrum 158	Spektrum 159
Te	98.62	95.66	97.68	68.38	67.62
Au	1.38	4.34	2.32	31.62	32.38
Sum	100.00	100.00	100.00	100.00	100.00

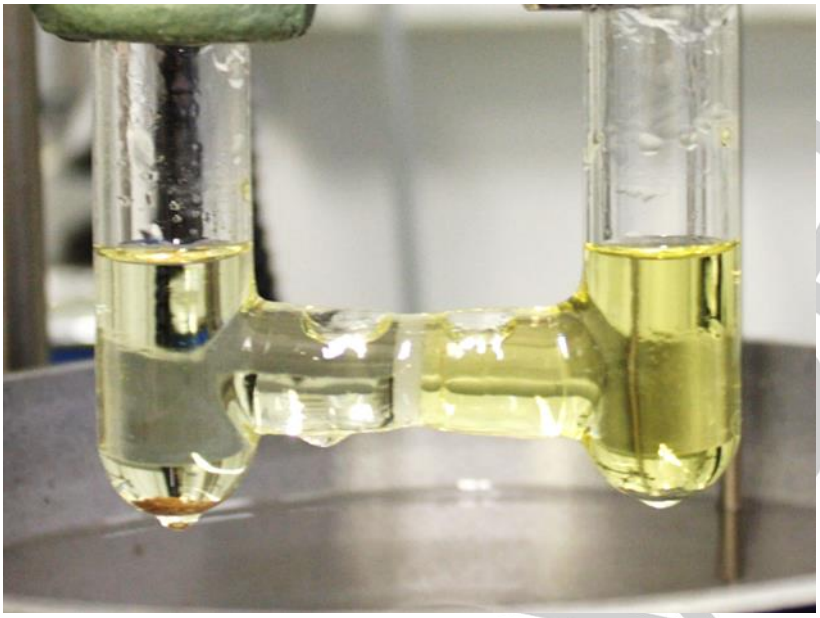

Figure S5. Picture of the diffusion experiment of Au (left side) and Te (right side) in $[P_{66614}]Cl$ after one week at 200 °C.

Figure S6. Picture of the diffusion experiment with needles of Ag_2Te grown on the the silver (left side) and Te (right side) in $[P_{66614}]Cl$ after one week at 200 °C.

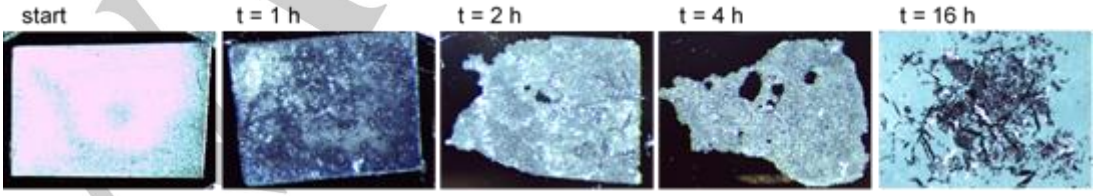

Figure S7. Passivation experiments of silver foil with Te in $[P_{66614}]Cl$ at different reaction times (1 h, 2 h, 4 h, 16 h) with full structural desintegration of the silver plate after 16 h by formation of needles of Ag_2Te

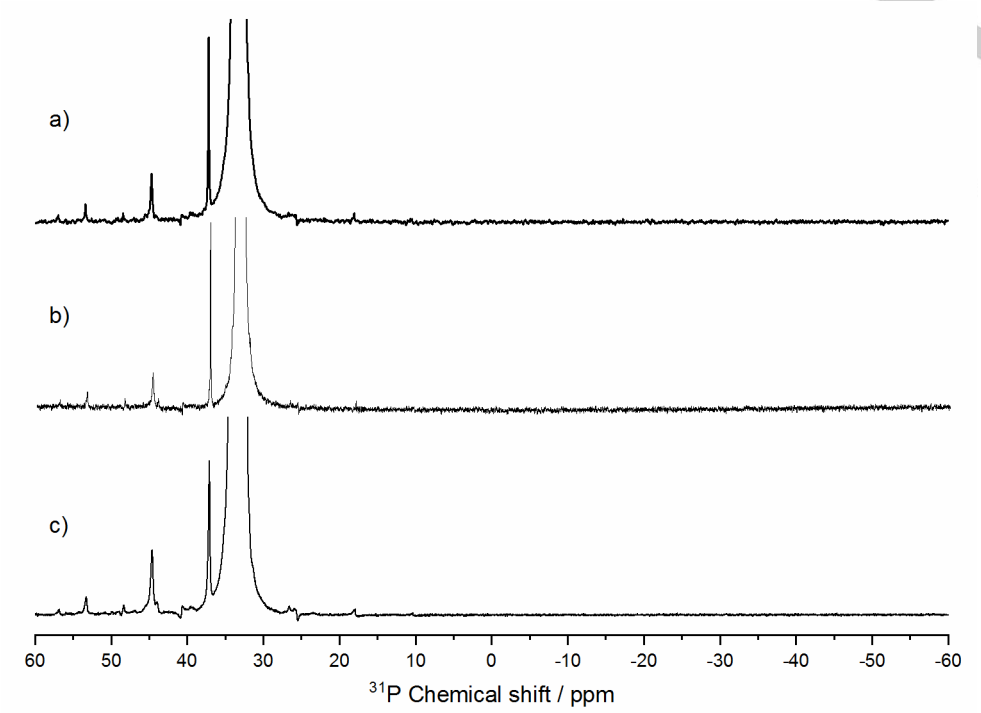

Figure S8. ^{31}P NMR of a) untreated purified [P_{66614}]Cl, b) after the solvation of Te and c) after the synthesis of Ag_2Te

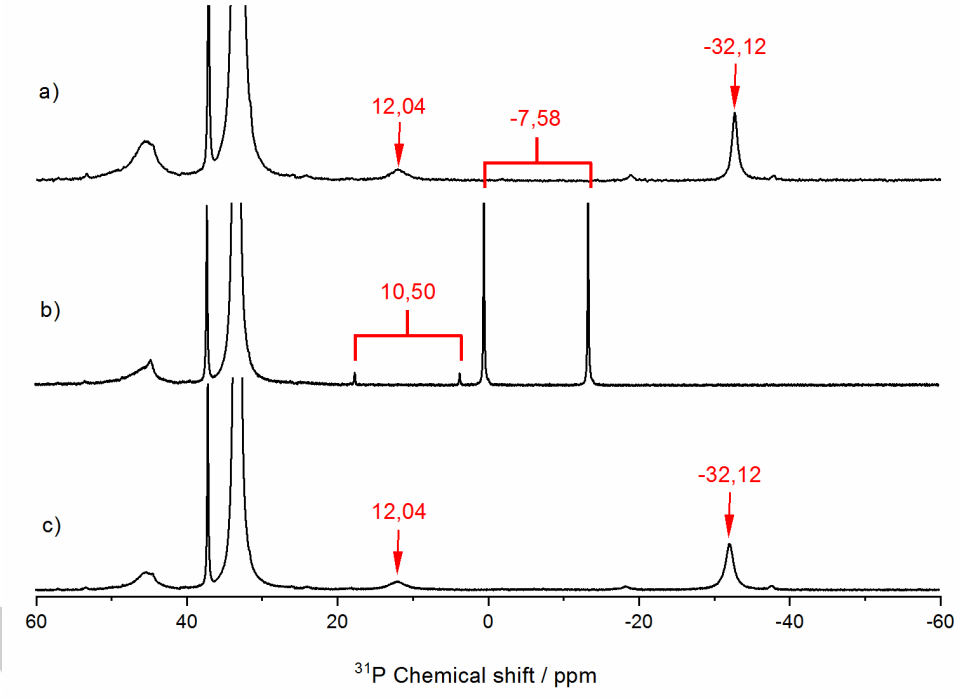

Figure S9. ^{31}P NMR of a) untreated commercially available [P_{66614}]Cl, b) after the solvation of Te and c) after the synthesis of Ag_2Te

Additional EDX data:

Gold telluride:

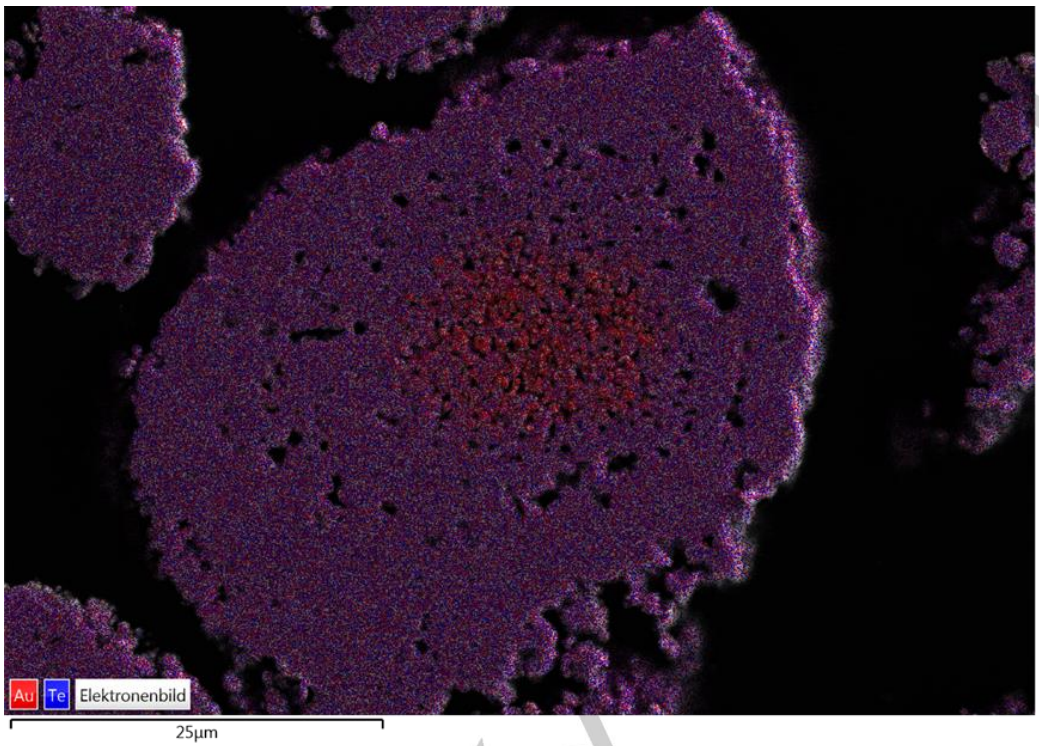

Figure S10. Overlay of EDX maps of a large particle from the synthesis (Au, Te powder, 200 °C, 16 h)

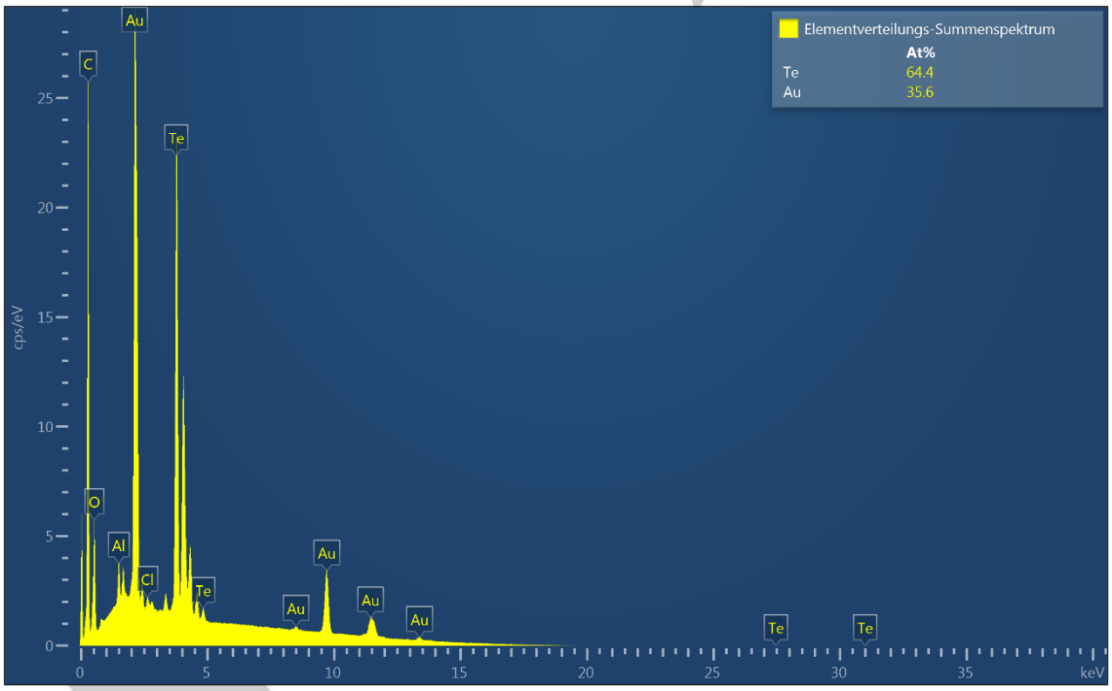

Figure S11. EDX sum spectra of S10

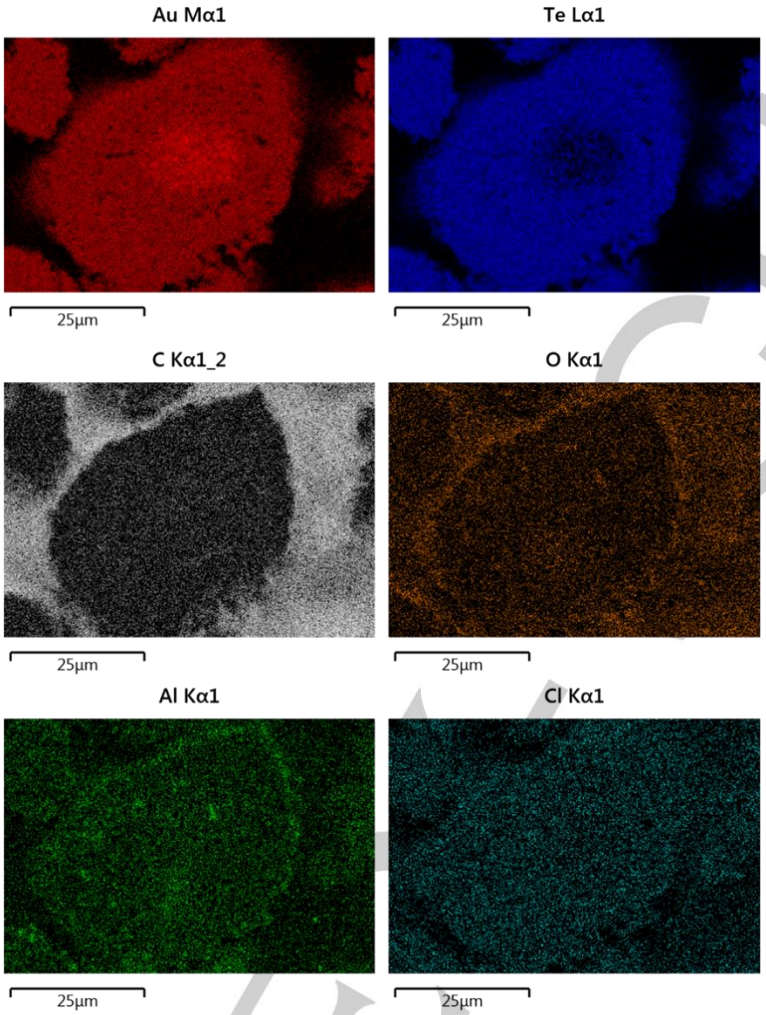

Figure S12. EDX maps of single Elements (Au, Te powder, 200 °C, 16 h)

Silver telluride

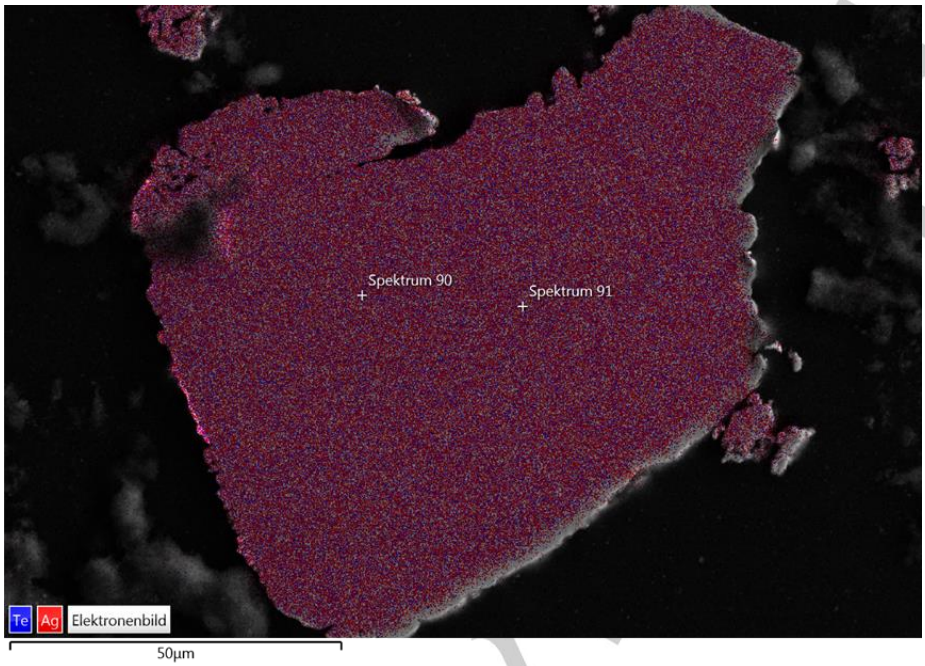

Figure S13. Overlay of EDX maps of a large particle from the synthesis (Ag, Te powder, 200 °C, 16 h)

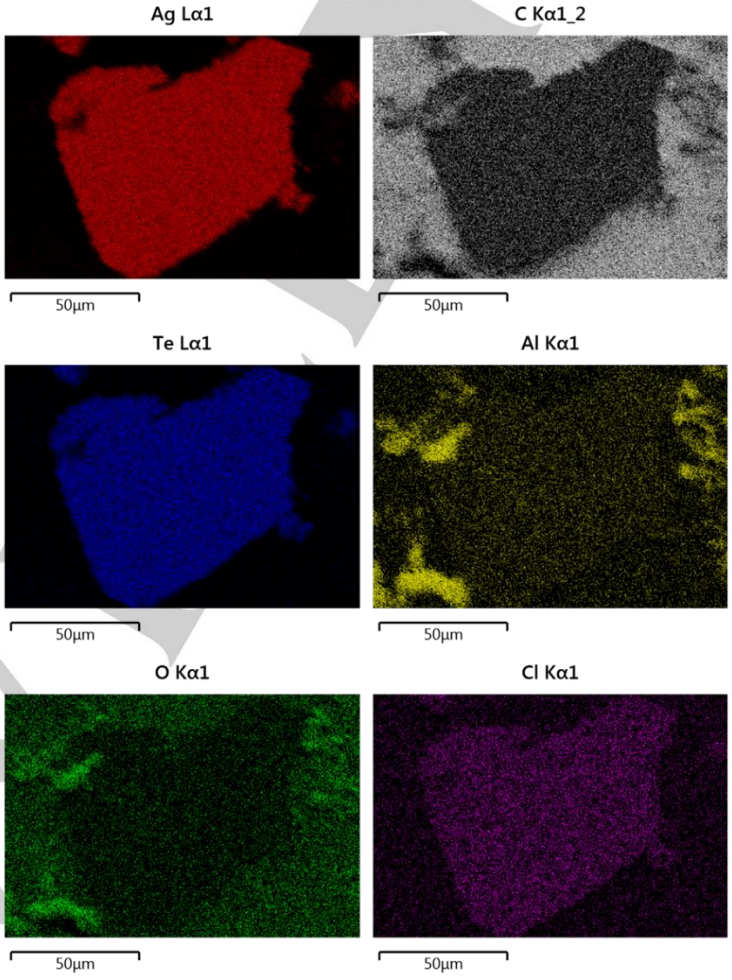

Figure S14. EDX maps of single Elements(Ag, Te powder, 200 °C, 16 h)

Table S2. Elemental distribution determined by EDX at the marked points in figure S4

	EDX element spectra	Spektrum 90	Spektrum 91
Ag	67.36	67.57	67.20
Te	32.64	32.43	32.80
Sum	100.00	100.00	100.00
Statistik	Ag	Te	
Max	67.57	32.80	
Min	67.20	32.43	
Average	67.38	32.62	
Standard deviation	0.18	0.18	