Production of high temperature superconducting Thallium-based thin-film coatings

AISHA SABA

A. Leveratto, R. Vaglio, M. Putti , C. Ferdeghini, C. Bernini, E. Bellingeri

CNR-SPIN, Genova ITALY

A. Moros, S. Hollies, J. Bernardi, M. Eisterer

TU-WIEN, USTEM, ATOMINSTITUT, WIEN, AUSTRIA

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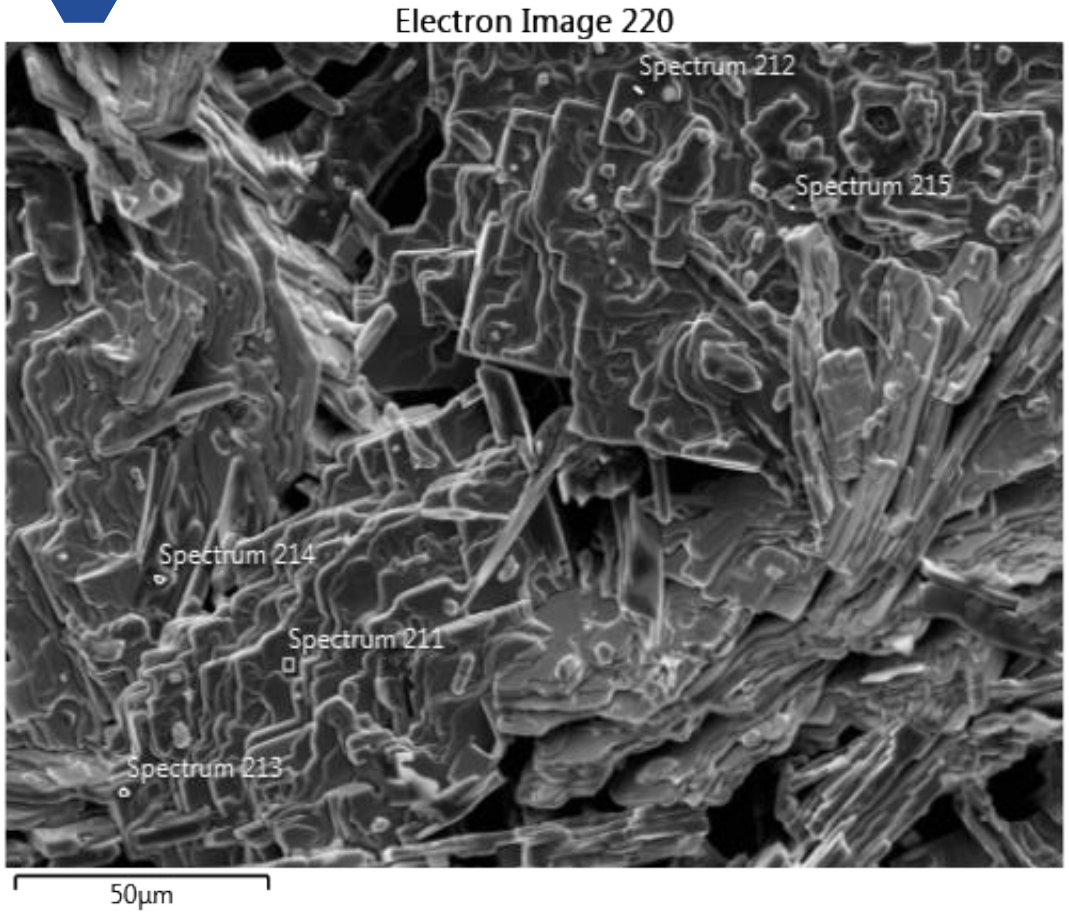
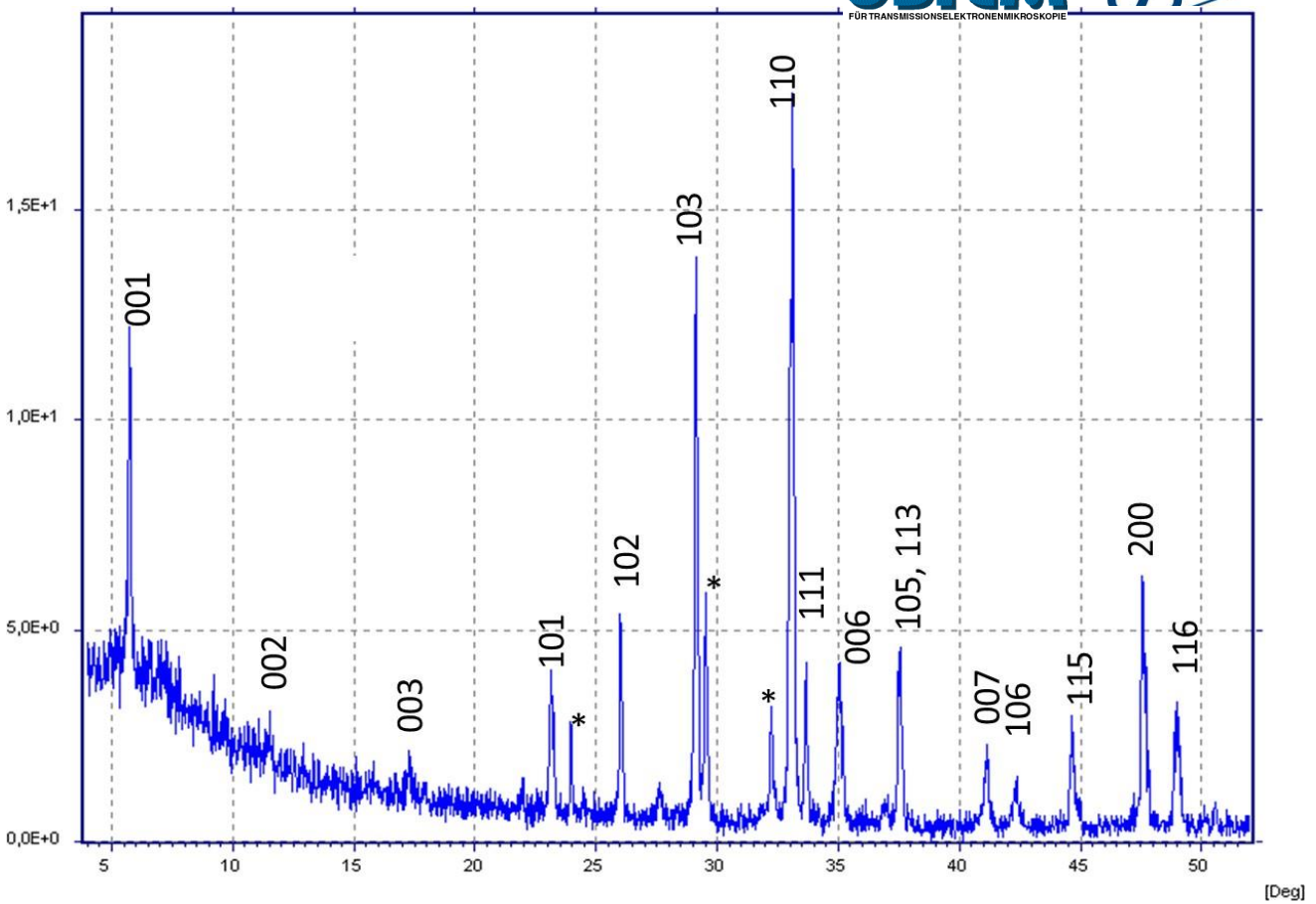
EASITrain





Pellet shows big grains and XRD pattern shows the phase (1223) is almost pure. * is Tl(1212) phase.

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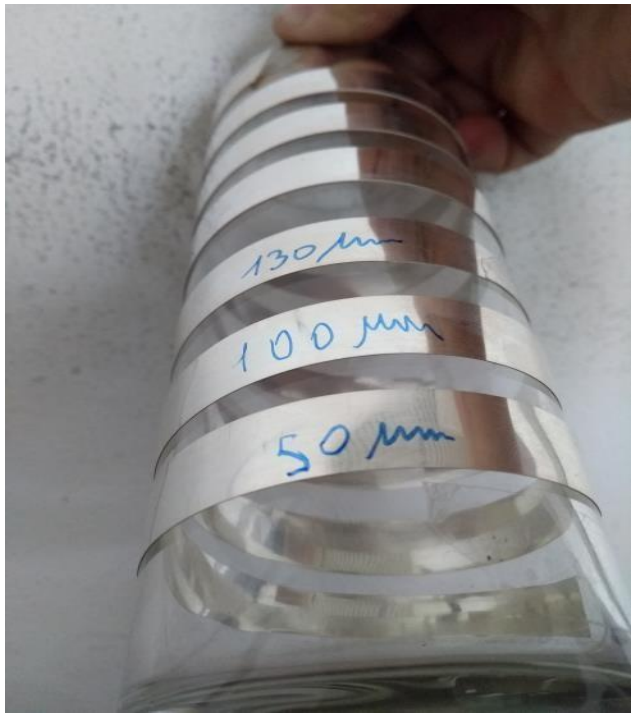
Substrates

1.Silver Substrate

Silver rod is being used to roll to get substrate
(80,100, 130 micro meter)
Annealing at high temperature to stabalize the substrate for high temperature treatment of the thin films



2. SrTiO3

Commercial substrates
Deposition of silver layer (20nm)

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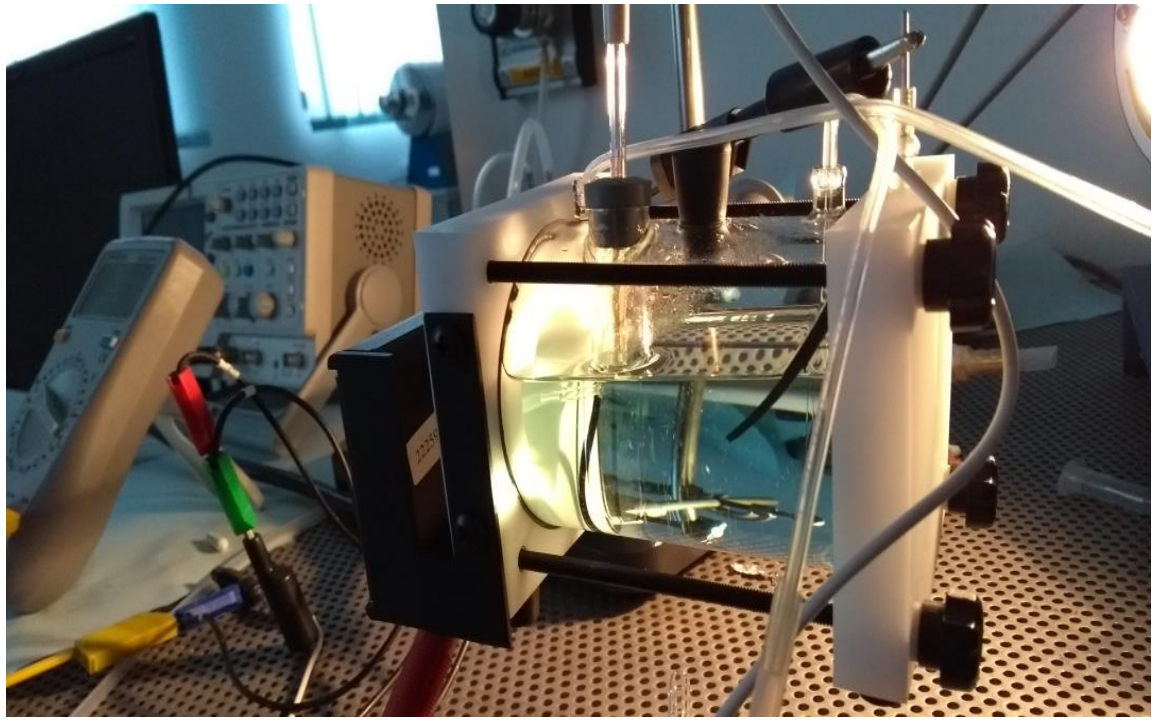
Methods for depositing the thin film Precursors



- Fast
- Cheap
- Scalable
- Feasible
- Better

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Thallination of the samples

Thallium is volatile(717 C) and Toxic in nature

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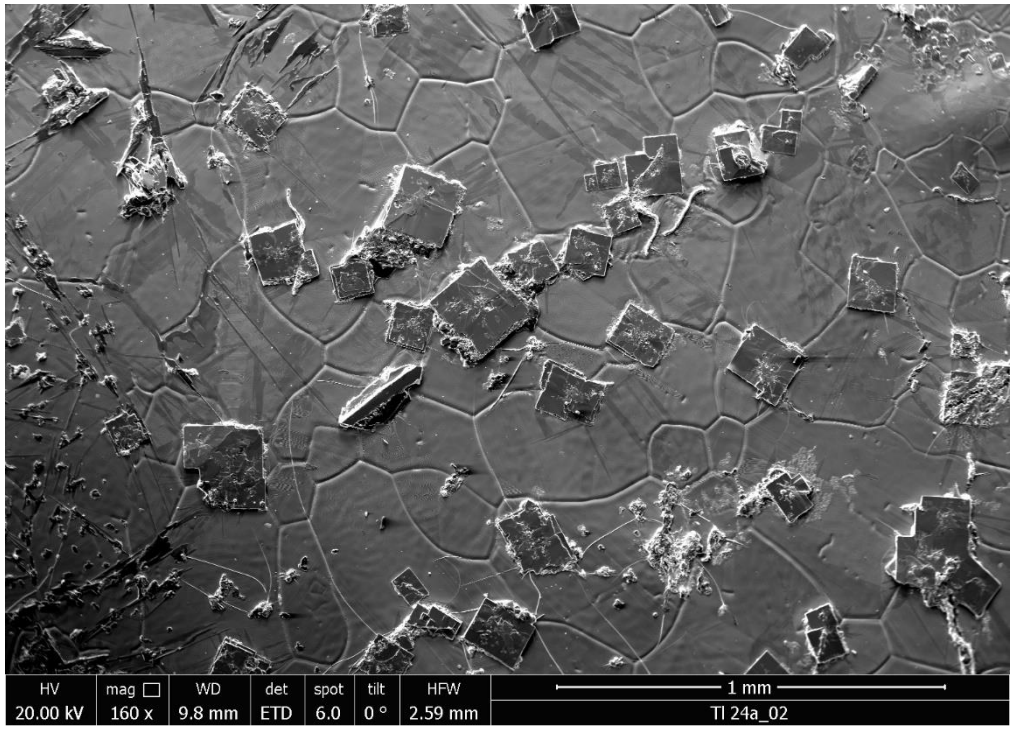
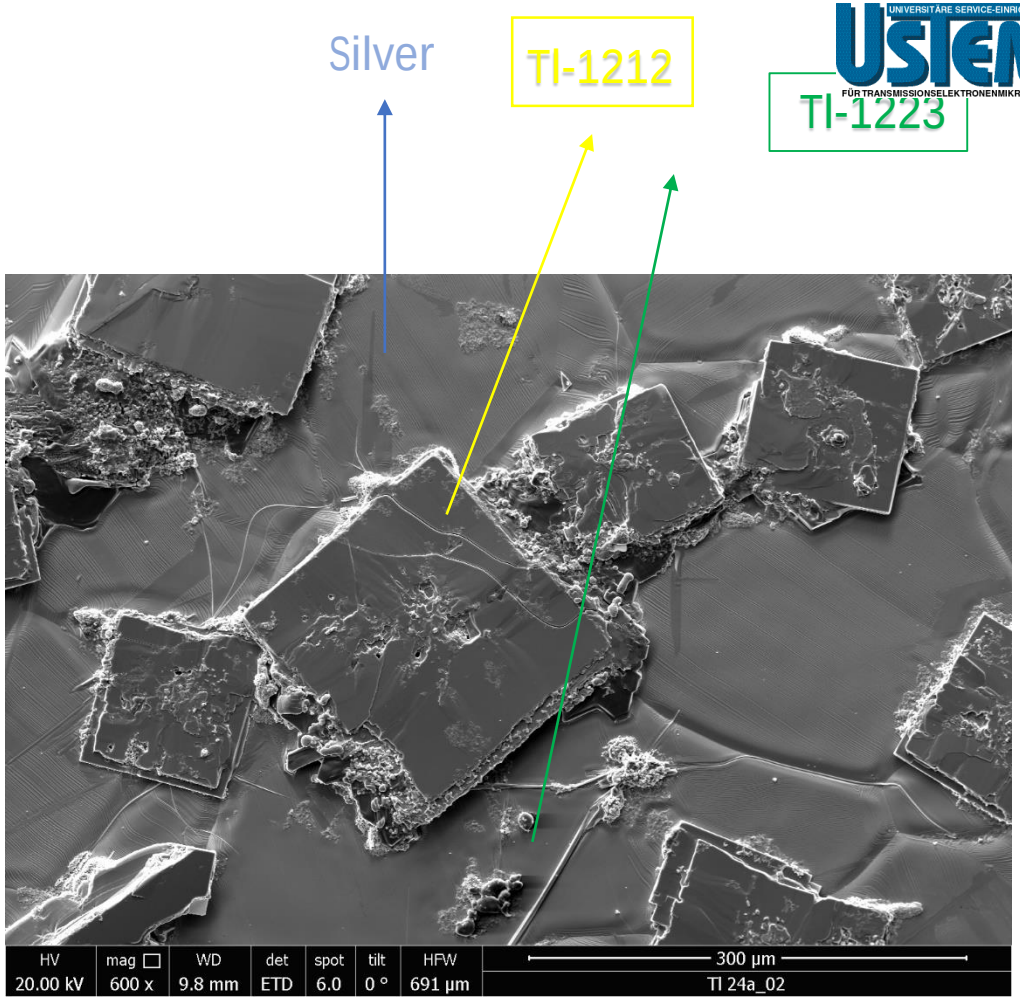
Thin Film on the silver substrate





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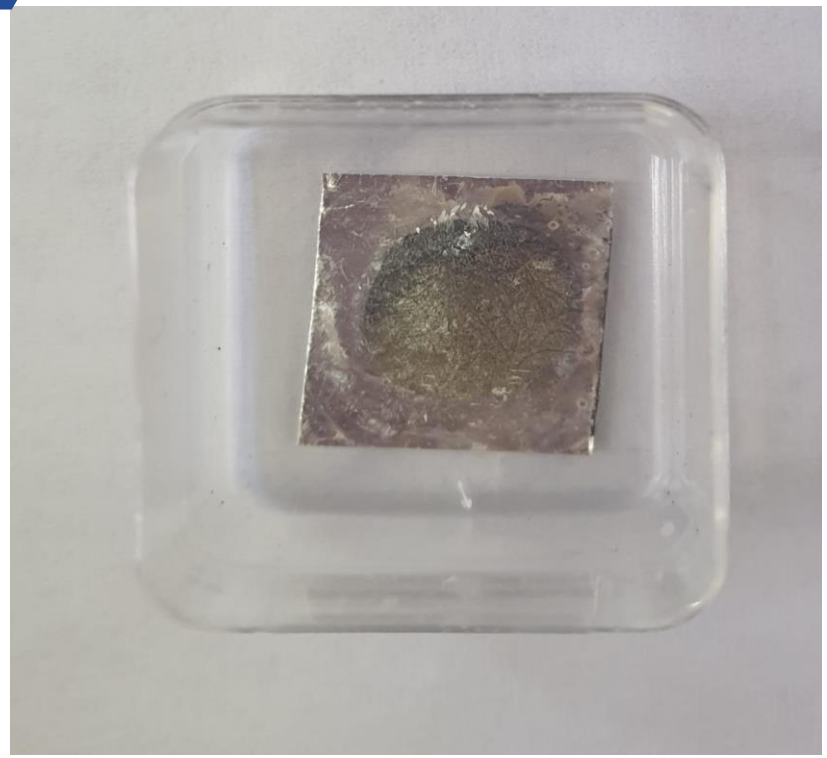
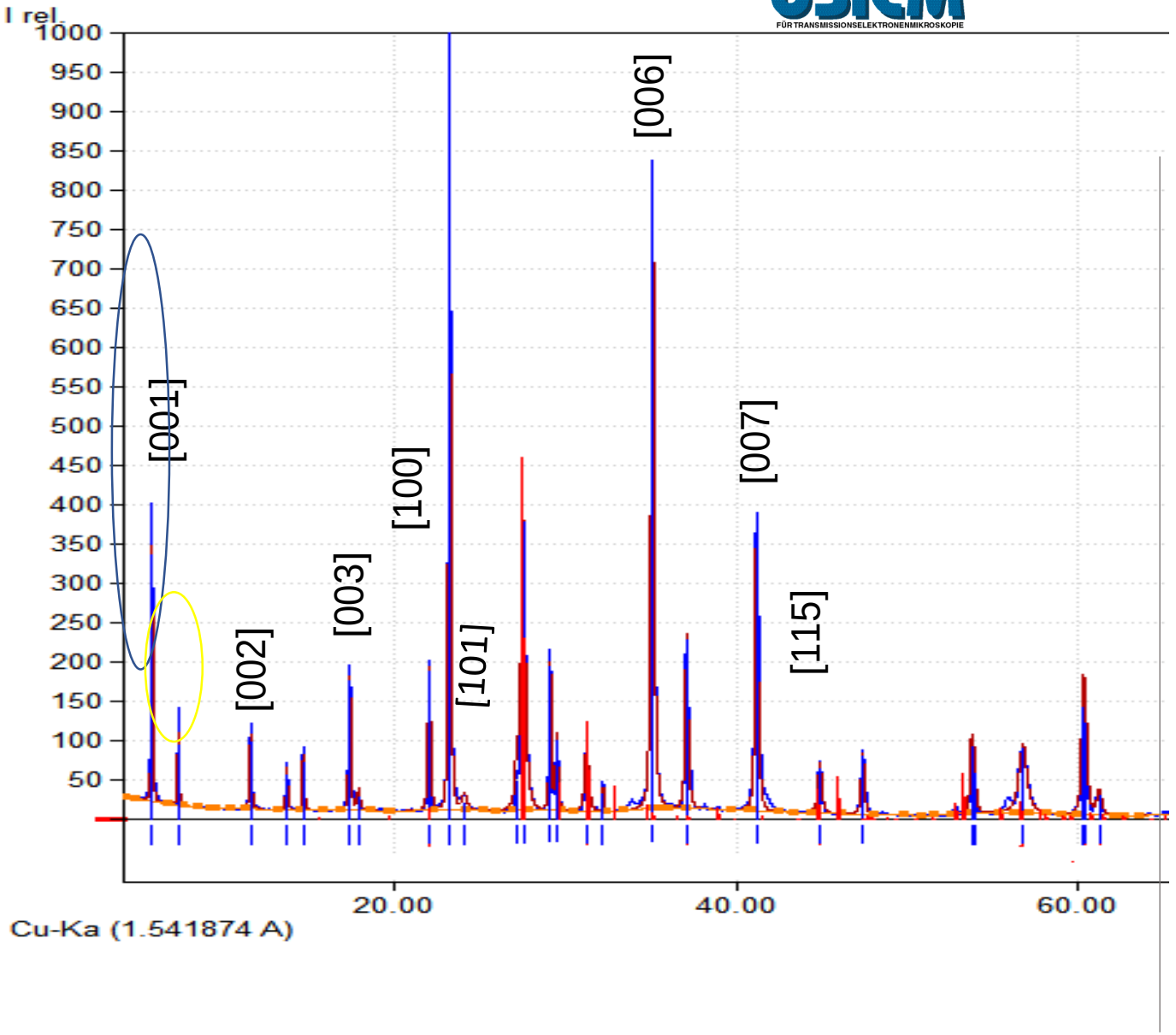
EASITrain

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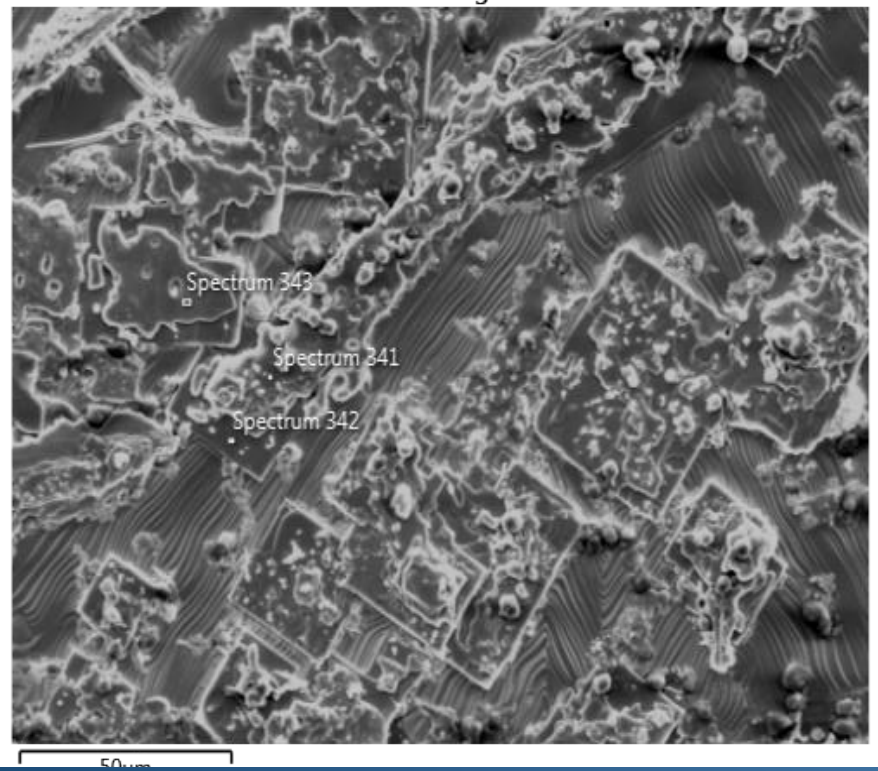
Cu-Ka (1.541874 A)

Thin Film on the silver substrate

Electron Image 310



Quant Results View

Viewed Data: Multiple Spectra Result Type: Atomic %

Spectrum Label	O	Ca	Cu	Sr	Ag	Ba	Tl	Pb	Bi
Spectrum 330	53.48	11.85	16.52	11.29	0.86	0.38	3.20	1.91	0.51
Spectrum 333	53.59	11.83	16.13	10.88	0.32	0.62	3.84	1.98	0.81
Spectrum 335	50.13	12.24	18.46	11.94	0.16	0.72	3.57	2.07	0.71
Spectrum 336	52.15	12.01	18.24	11.16	0.00	0.49	3.45	1.71	0.80
Spectrum 337	49.61	8.18	17.22	14.58	0.16	0.92	6.25	2.00	1.07
Spectrum 338	45.22	43.62	1.21	0.65	5.64	0.06	3.23	0.13	0.24
Spectrum 341	52.22	10.26	17.03	11.97	0.13	1.25	4.88	1.66	0.60
Spectrum 342	53.24	8.77	13.76	8.93	9.40	1.22	2.48	1.64	0.56
Spectrum 343	54.30	7.26	15.34	13.04	0.16	1.30	6.55	1.56	0.49

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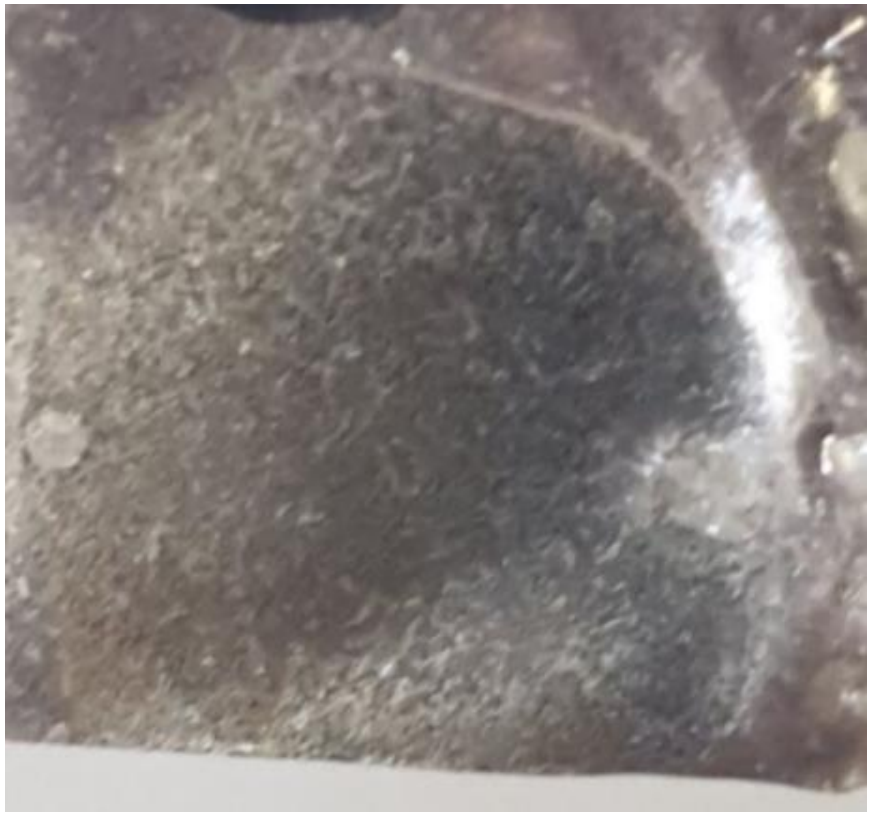

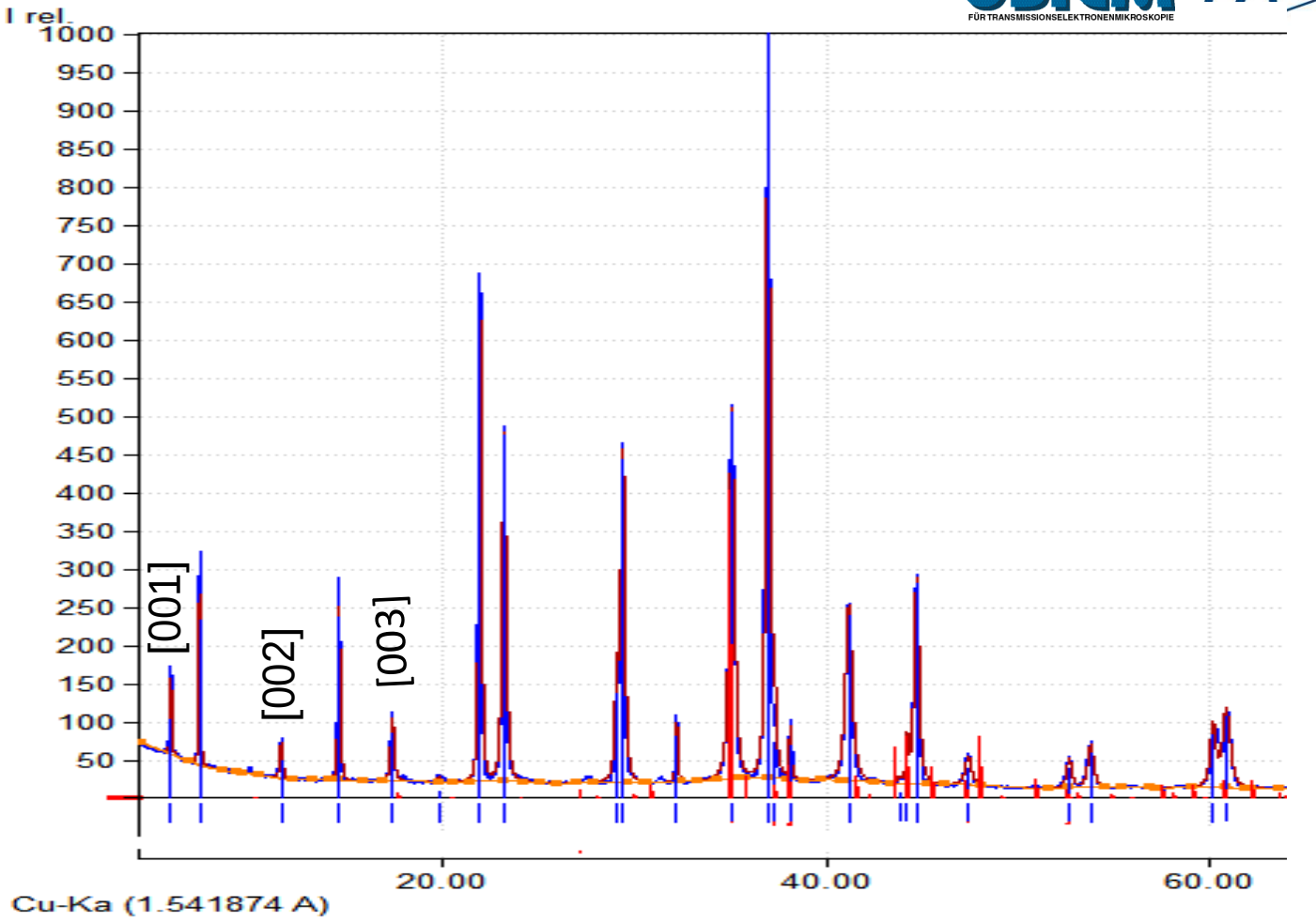

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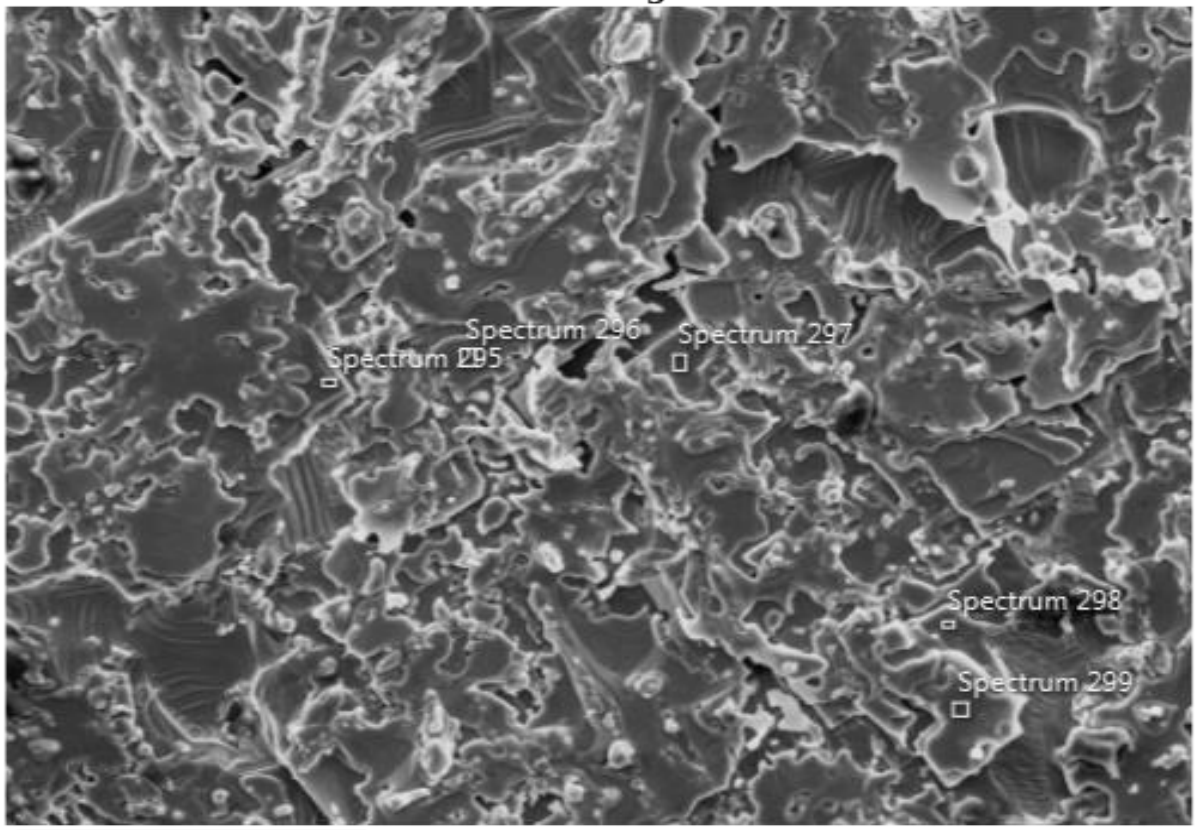
Electron Image 276



Quant Results View

Viewed Data: Multiple Spectra

Result Type: Atomic %

Spectrum Label	O	Ca	Cu	Sr	Ag	Ba	Tl	Pb	Bi	Total
Spectrum 295	53.01	11.39	17.57	9.87	0.16	2.01	3.39	2.03	0.56	100.00
Spectrum 296	58.16	5.80	13.20	12.40	0.48	1.88	6.21	1.25	0.62	100.00
Spectrum 297	57.50	8.28	12.34	6.80	8.58	2.06	2.79	1.17	0.46	100.00
Spectrum 298	56.51	9.16	13.96	7.48	6.66	1.76	2.77	1.31	0.38	100.00
Spectrum 299	55.23	6.28	14.82	12.78	0.14	2.21	6.23	1.46	0.84	100.00

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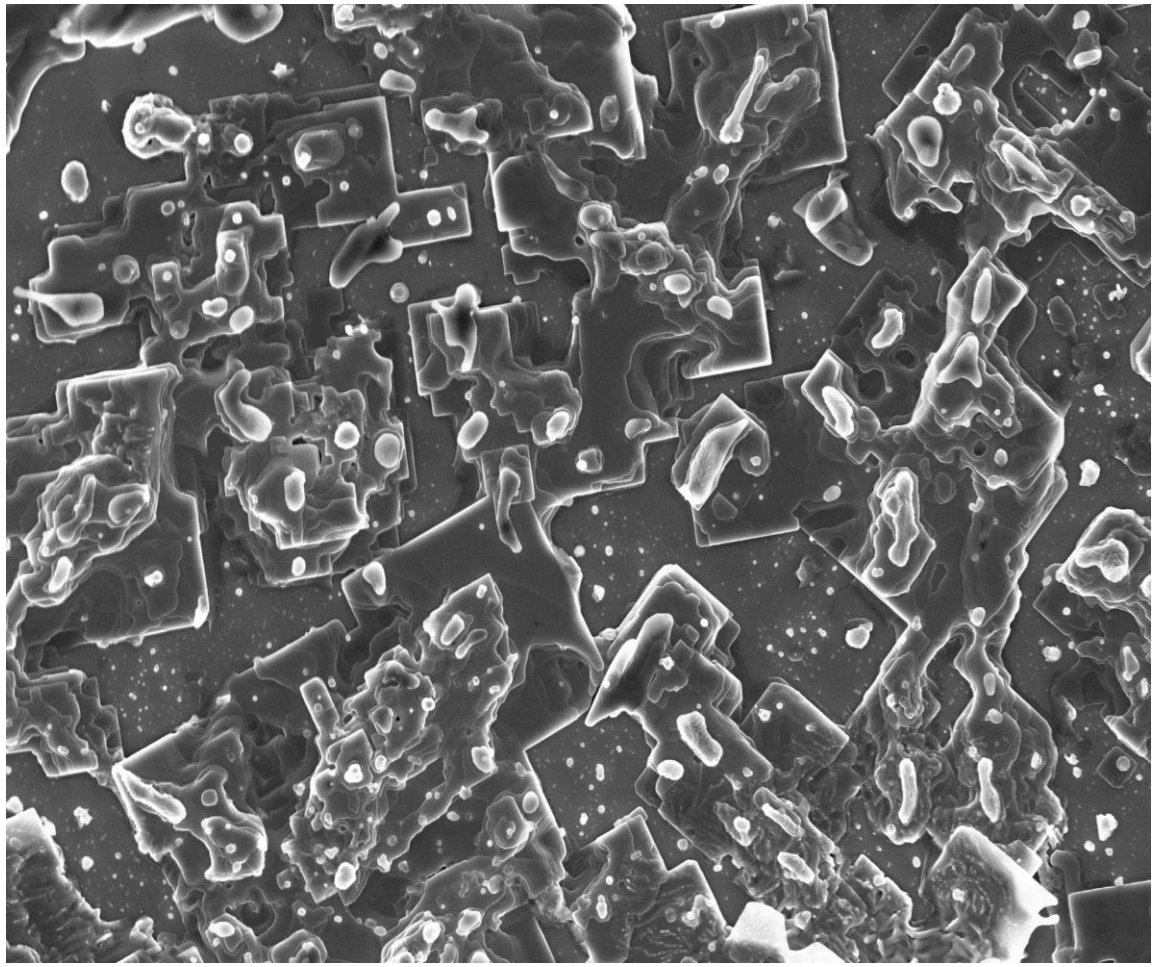
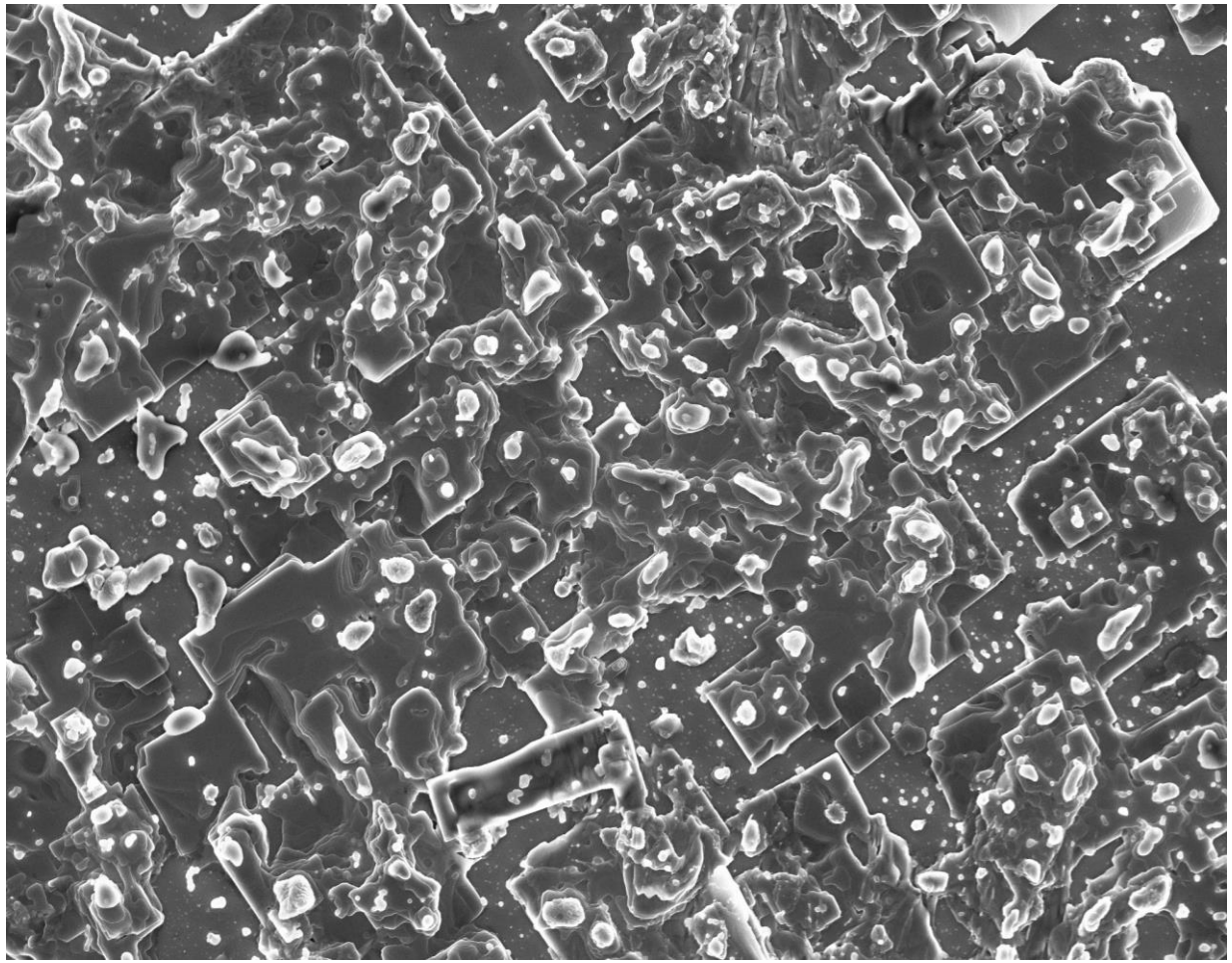
Samples Thin film on the SrTiO3 substrate





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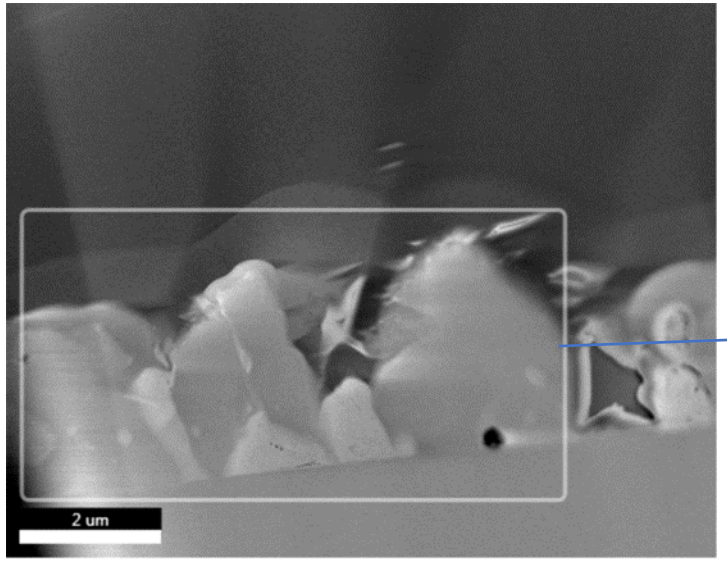
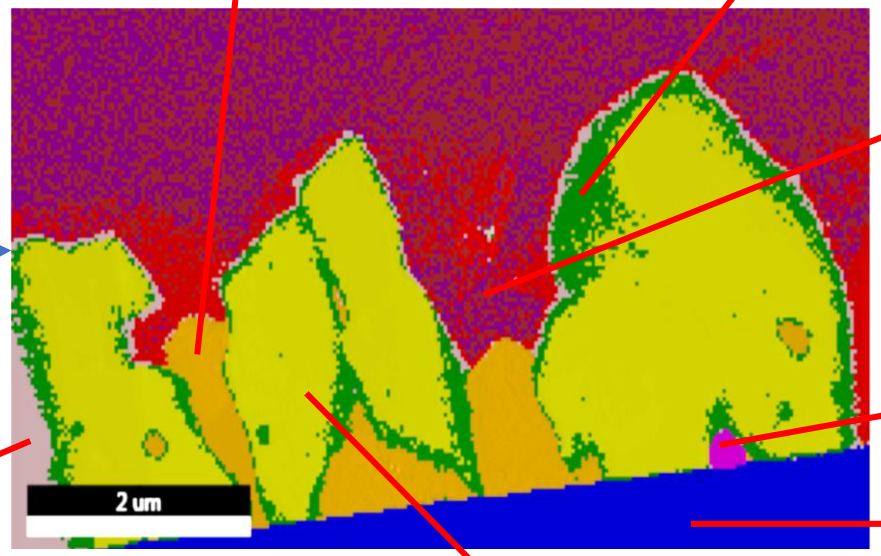
TEM

STI019_12: EDX elemental mapping



Film thickness ~ 2 µm



Ca rich area

Cu++, Ca+

Bi rich area

Ag rich spot

Substrate: STO

Cu++, Ca+, Sr+

TI, Ca rich area

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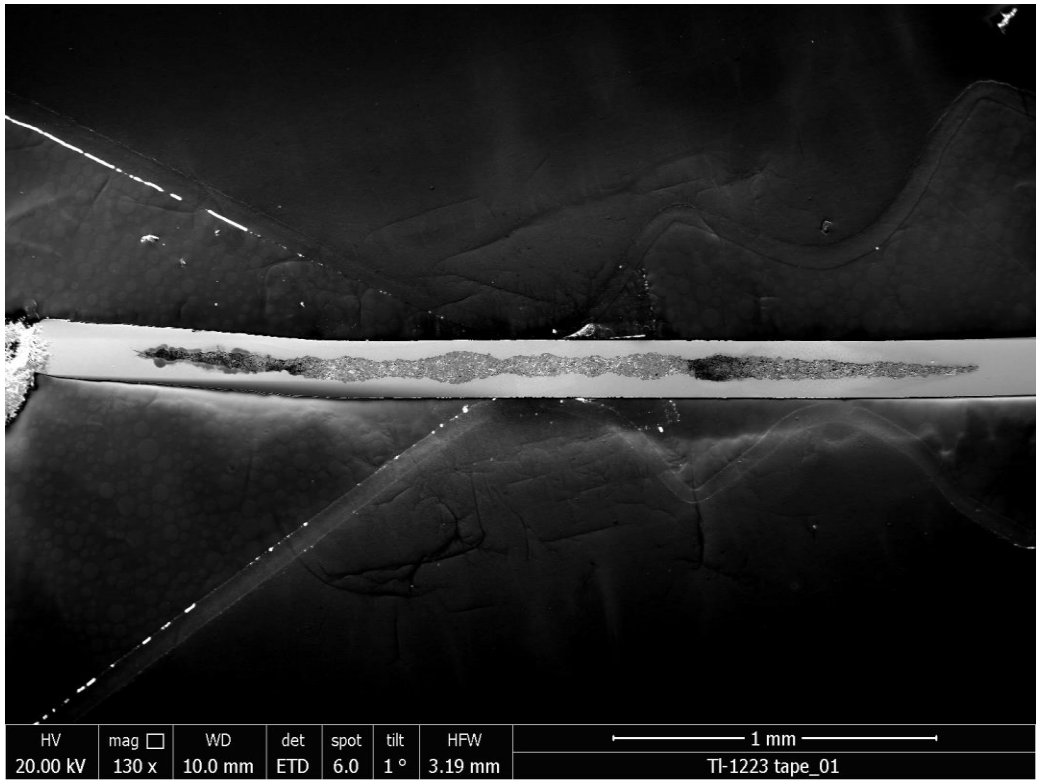
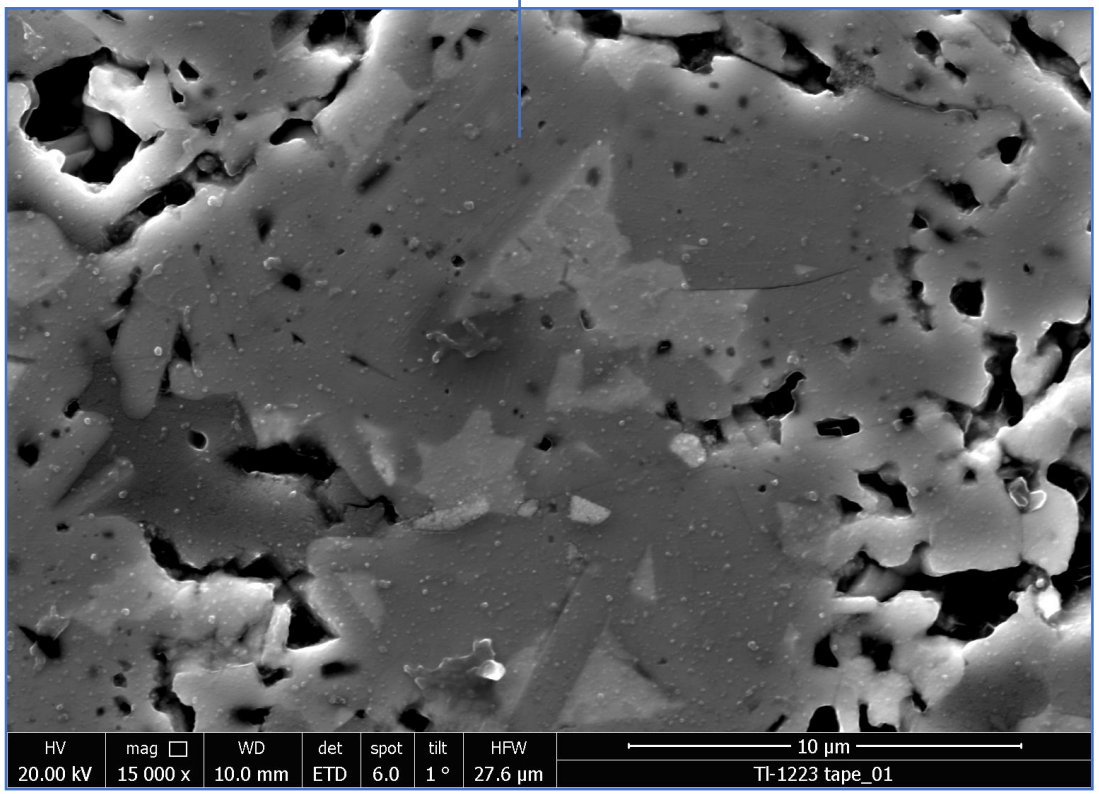
SEM

Thallium Tapes



1223



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Other activities

- Ph.D Course work
- Italian language course

- Secondment at CERN
- if any volatile materials are released in vacuum (Tl-1223 contains Tl, Ba, Sr, Ca)
- SEY(With Carbon Coating)
- XPS

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Thank you

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