

EUROFER IMPROVEMENT BY OPTIMIZED CHEMICAL COMPOSITIONS

Jan Hoffmann, Michael Rieth, Michael Klimenkov, Siegfried Baumgärtner

Chemical compositions / Heat treatments

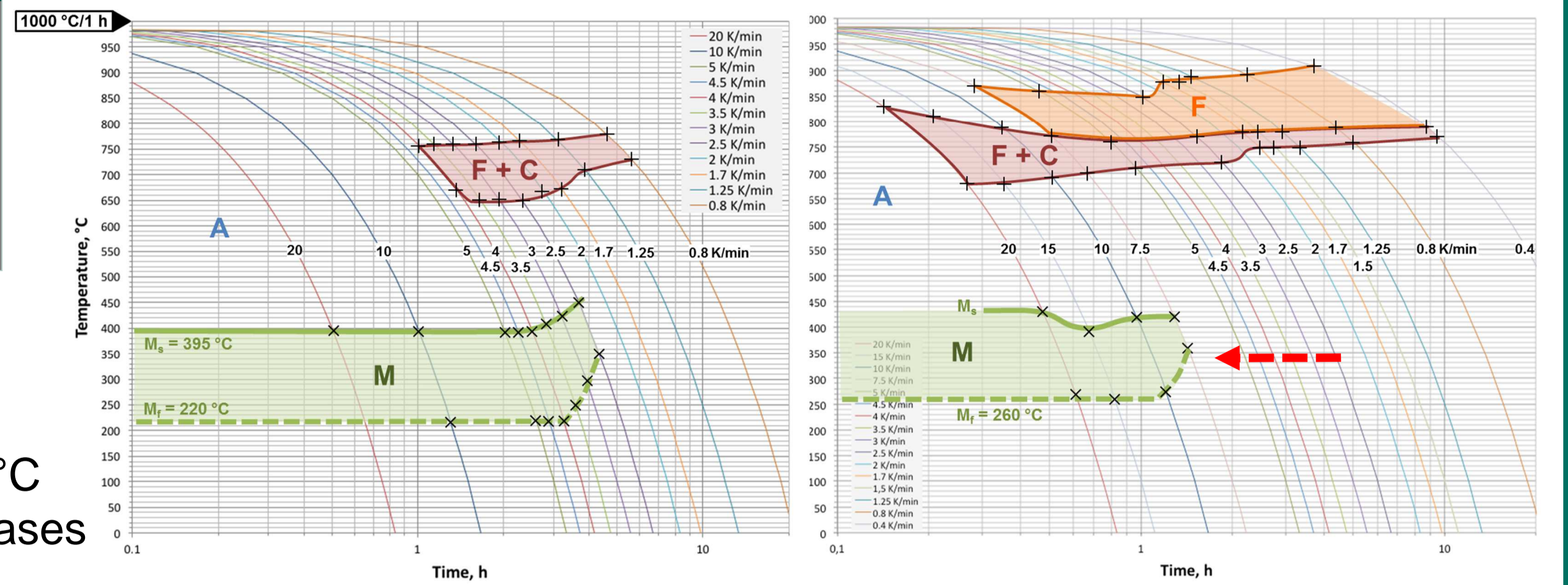
No.	Name	Cr	W	V	Ta	C	N
J361	EUROFER-s	8.7	1.14	0.2	0.09	0.105	0.05
J362	EUROFER-LV	8.7	1.07	0.35 ↑	0.1	0.058 ↓	0.05
J363	EUROFER-V	8.7	1.08	0.35 ↑	0.09	0.11	0.05
J364	EUROFER-LVnoTa	8.7	0.97	0.29 ↑	- ↓	0.059 ↓	0.05

A series of new 9%-Cr alloys was fabricated in collaboration with OCAS, Belgium. The goal of this study was to expand the operation window of EUROFER97.

A thermo-mechanical treatment (TMT) consisting of Ausforming from 1150°C down to 900°C was performed to optimize the distribution of secondary phases (carbides / nitrides)

Aim: Enable EUROFER for water-cooling applications

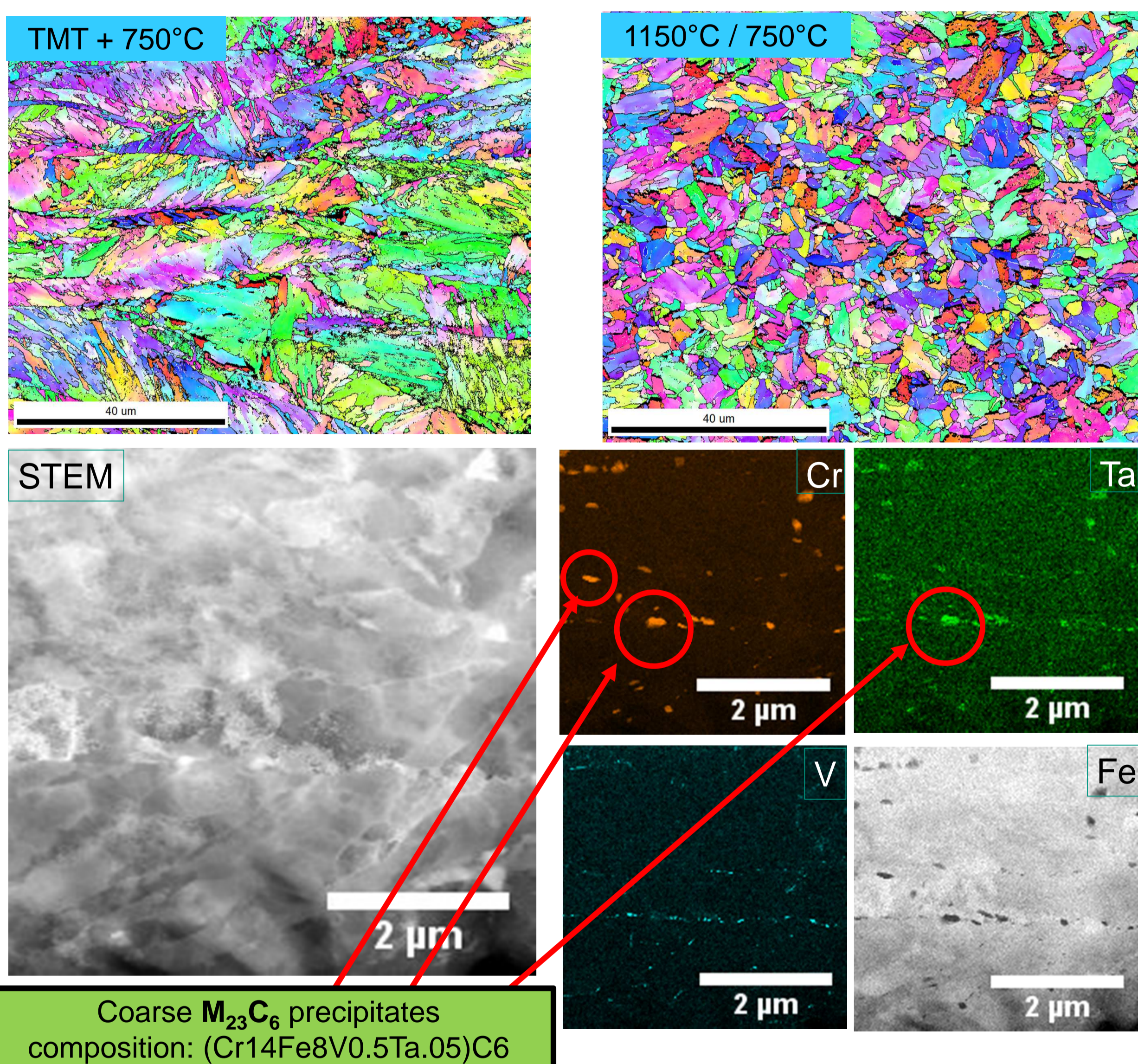
Phase stability (TTT)



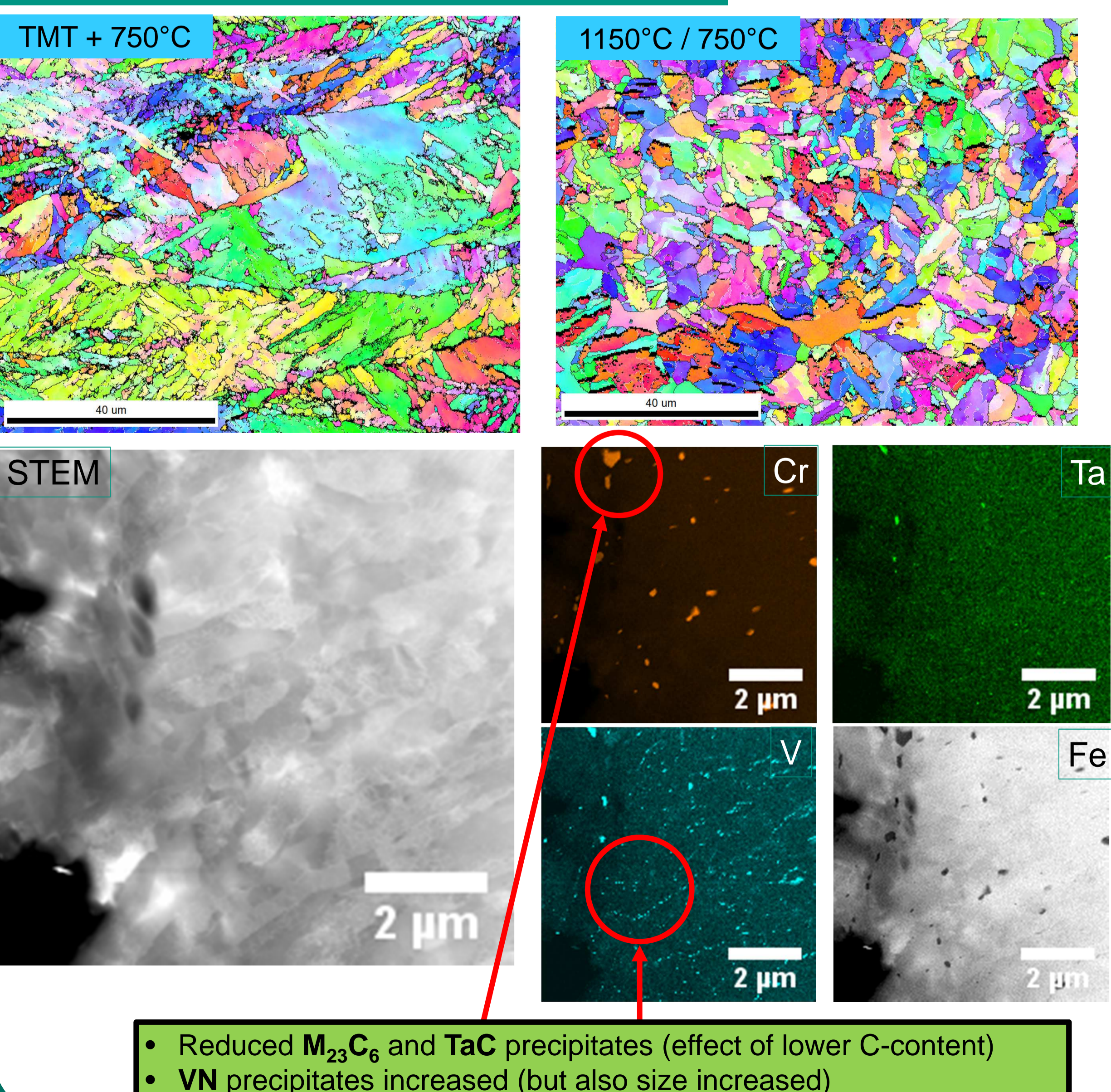
- Carbon-content has a major influence on phase formation
- Shift of M_f by 40°C, v_{crit} also increased (still feasible)

Microstructure / Precipitates

J361 / J363 (high carbon content)

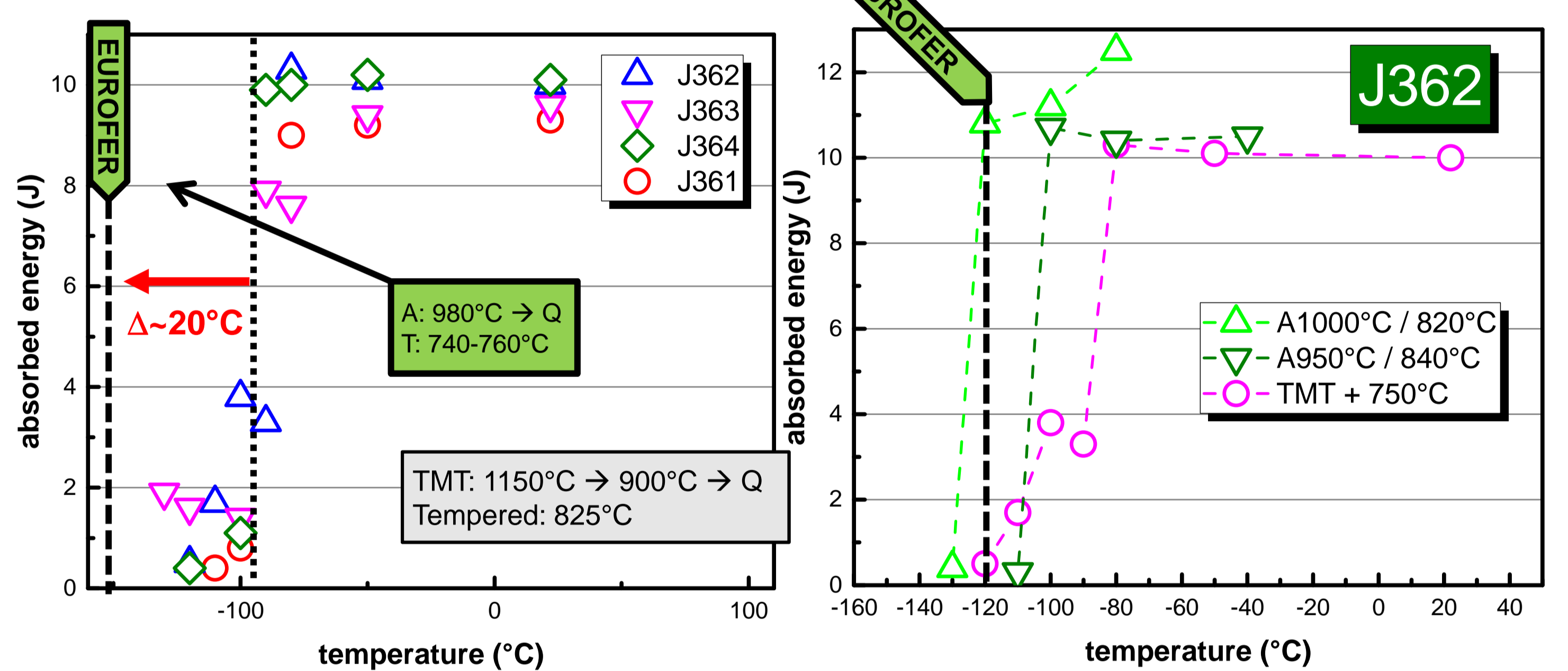


J362 / J364 (low carbon content)



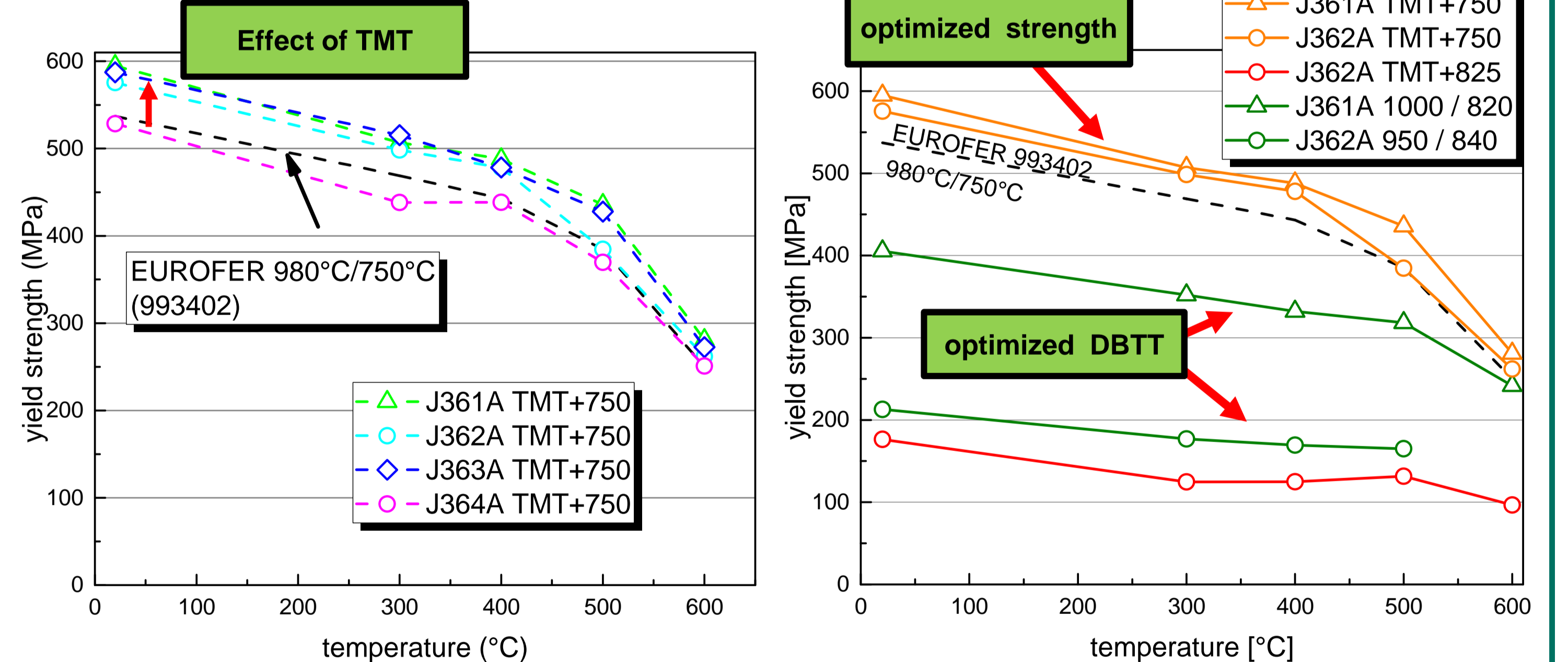
Mechanical properties

Charpy-impact



- TMT microstructure **not optimal** for Charpy-impact performance!
- Best materials (J362) reached performance of EUROFER97/3 (83699) (after „TMT removal“)

Tensile



- TMT + tempering is effective to gain high-temperature strength
- Mechanical properties can be varied across a wide range

Creep

