

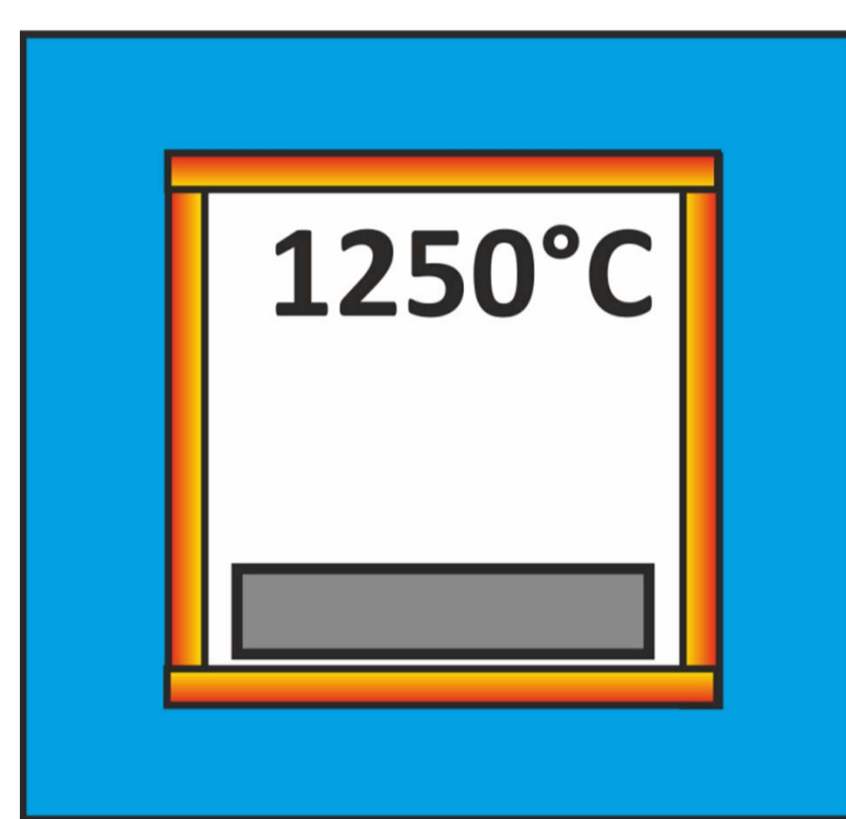


Improvement of RAFM steels through thermo-mechanical treatments

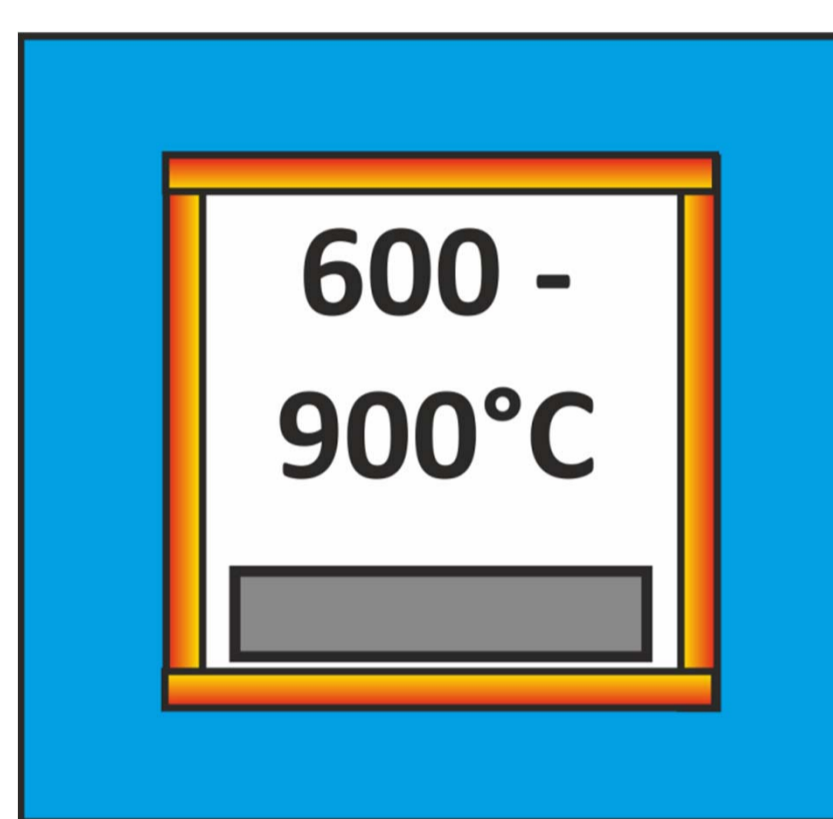
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Materials and Process

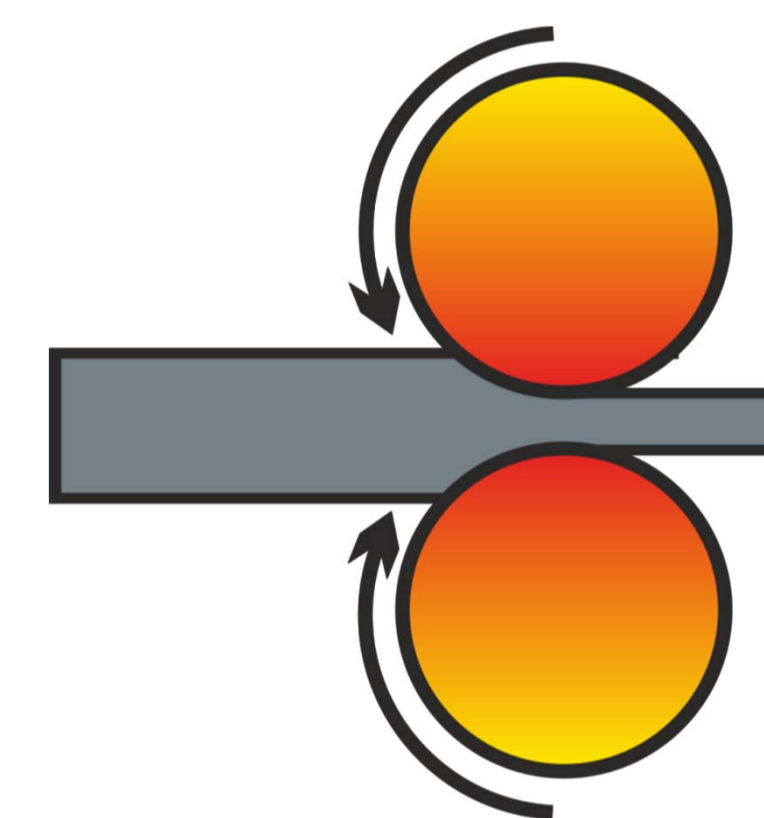
Batch	W	Cr	V	N	Ta	C	Fe
EUROFER97-2 993402	1.06	8.9	0.18	0.04	0.15	0.1	bal.
EUROFER97-2 993391	1.08	8.83	0.2	0.02	0.12	0.1	bal.



Dissolution of all secondary phases (carbides, nitrides)

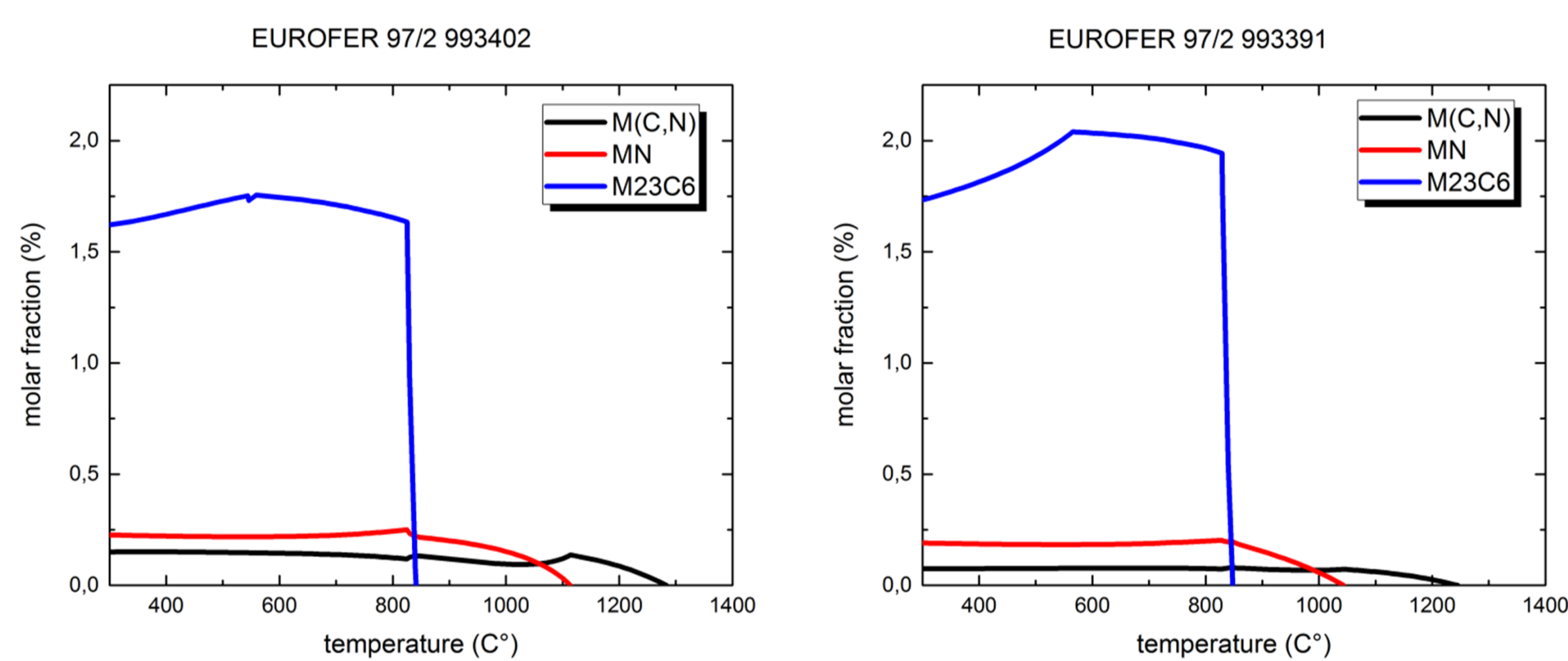


Cooling to rolling temperature in furnace (metastable austenite phase)



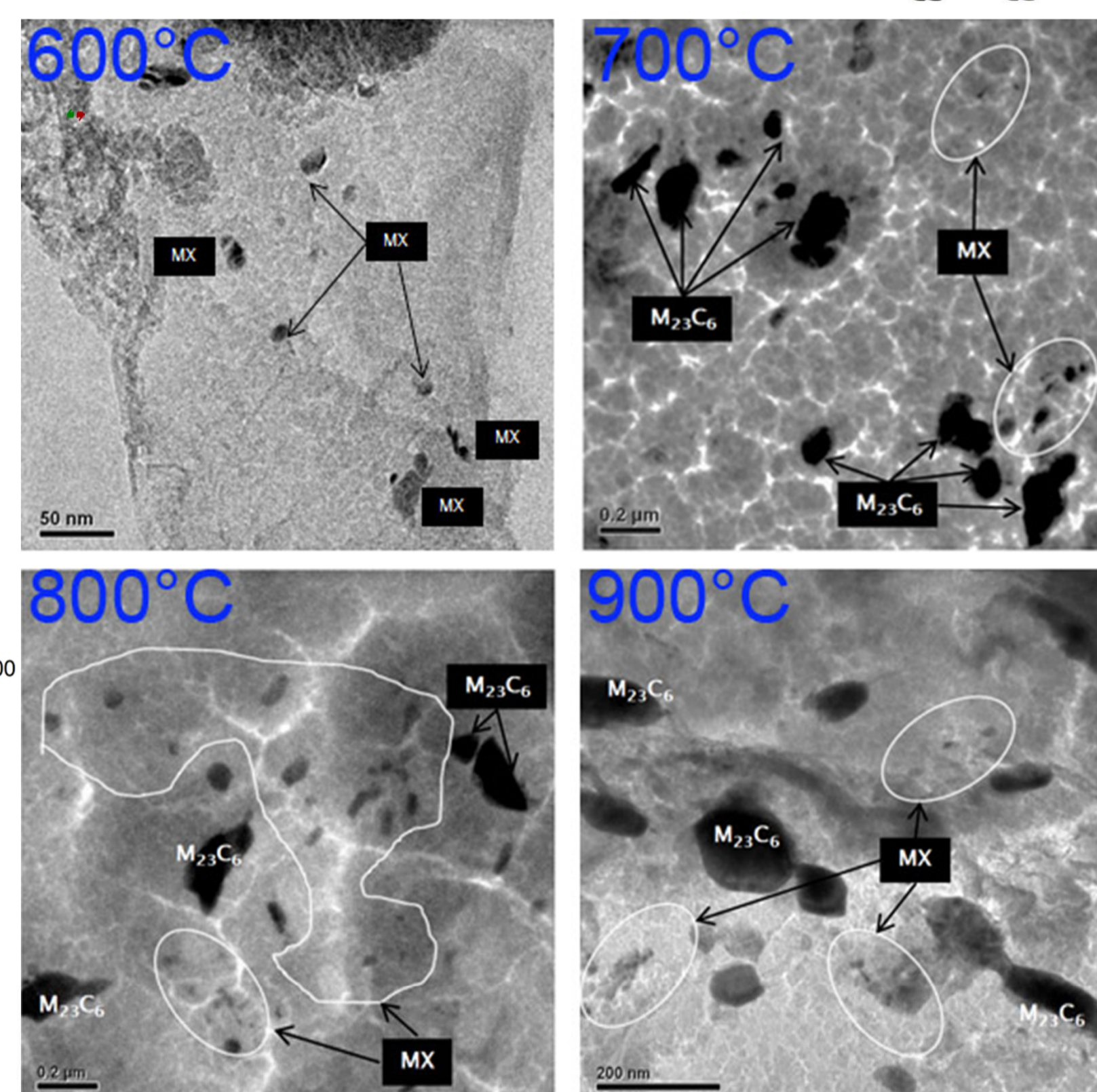
Rolling in the austenite phase

Thermodynamics



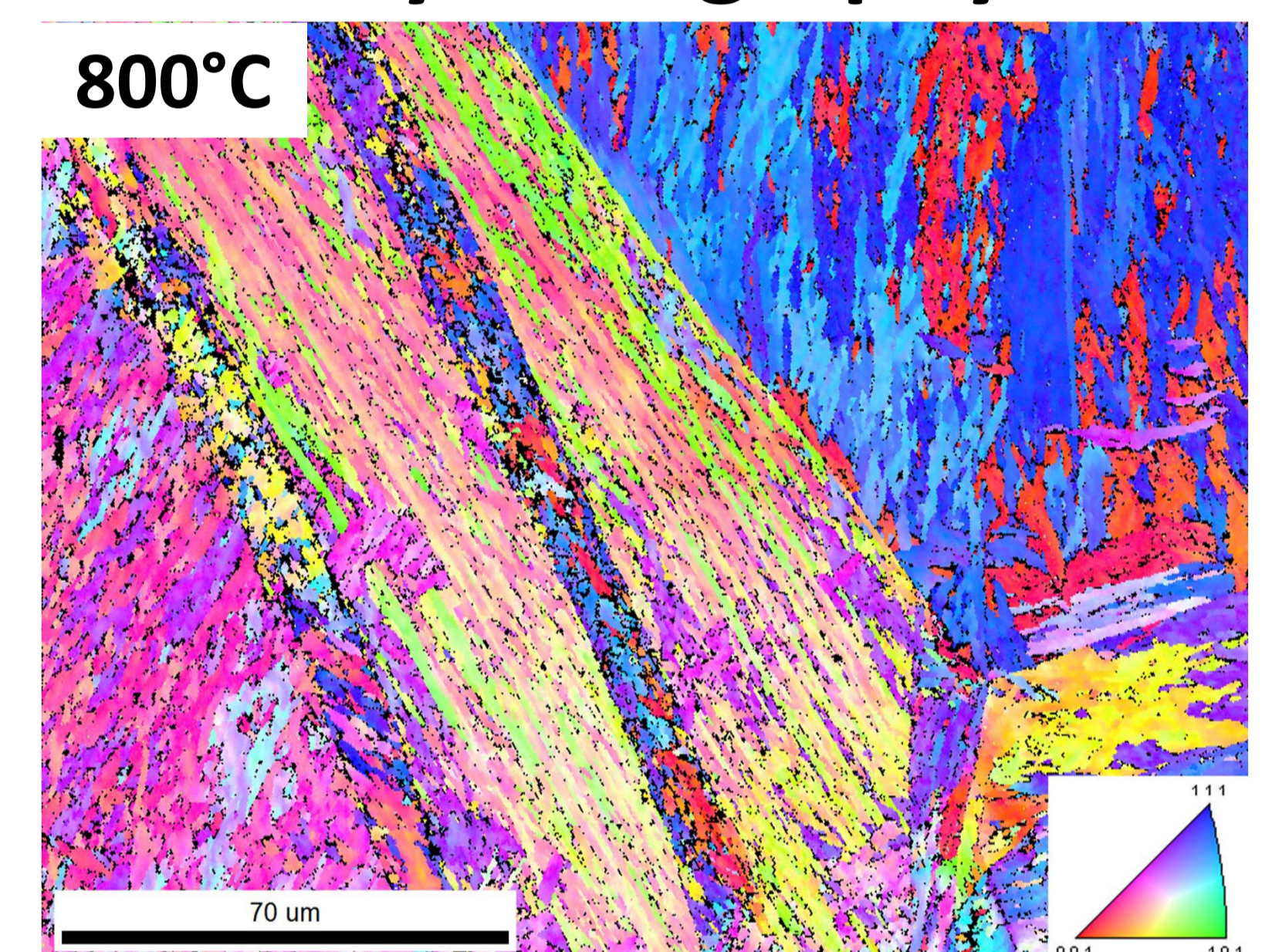
Predictions of secondary phases by simulation (JMatPro)

Microstructure



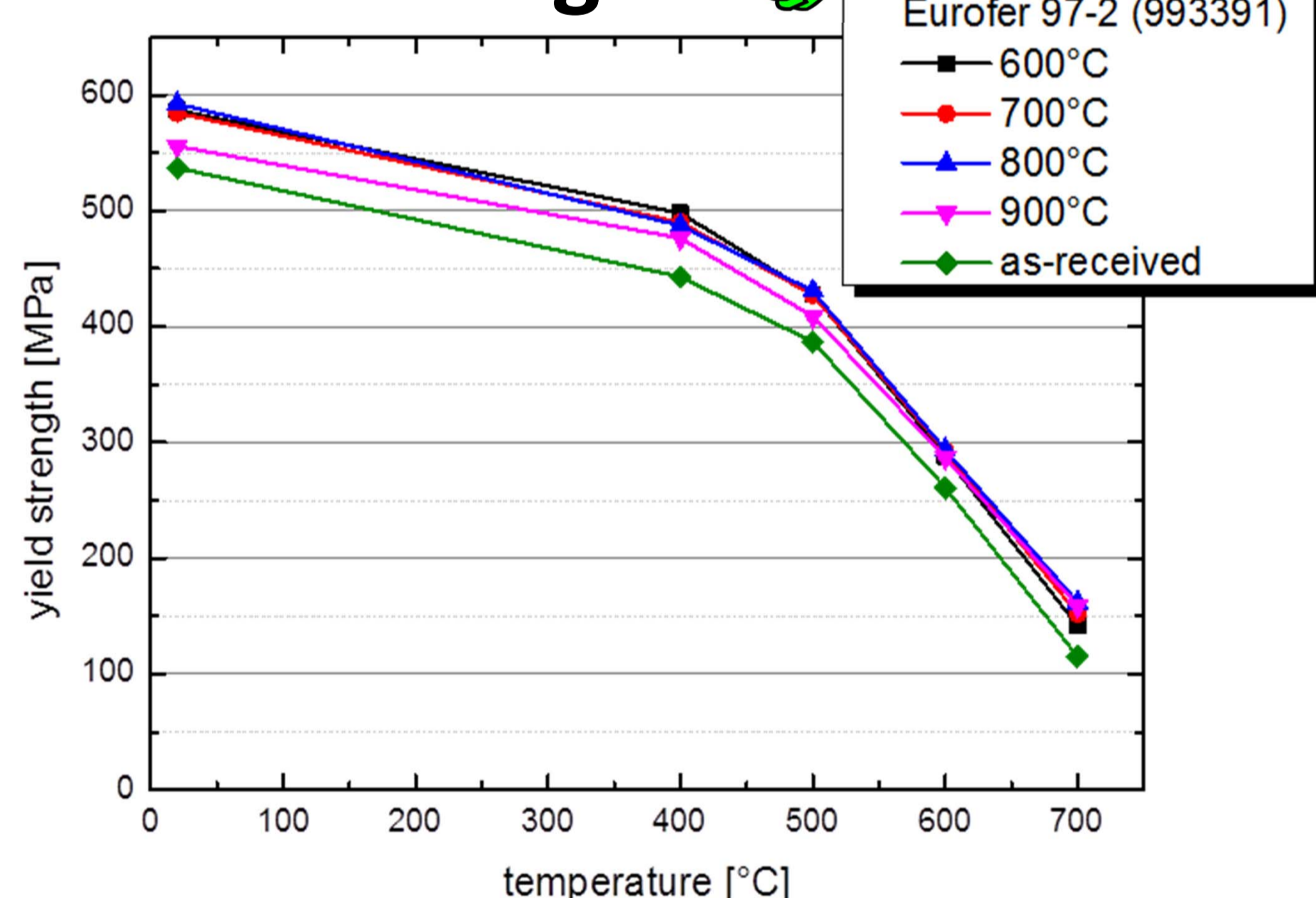
Fine distribution of carbides (TaC) and nitrides (VN)

Crystallography

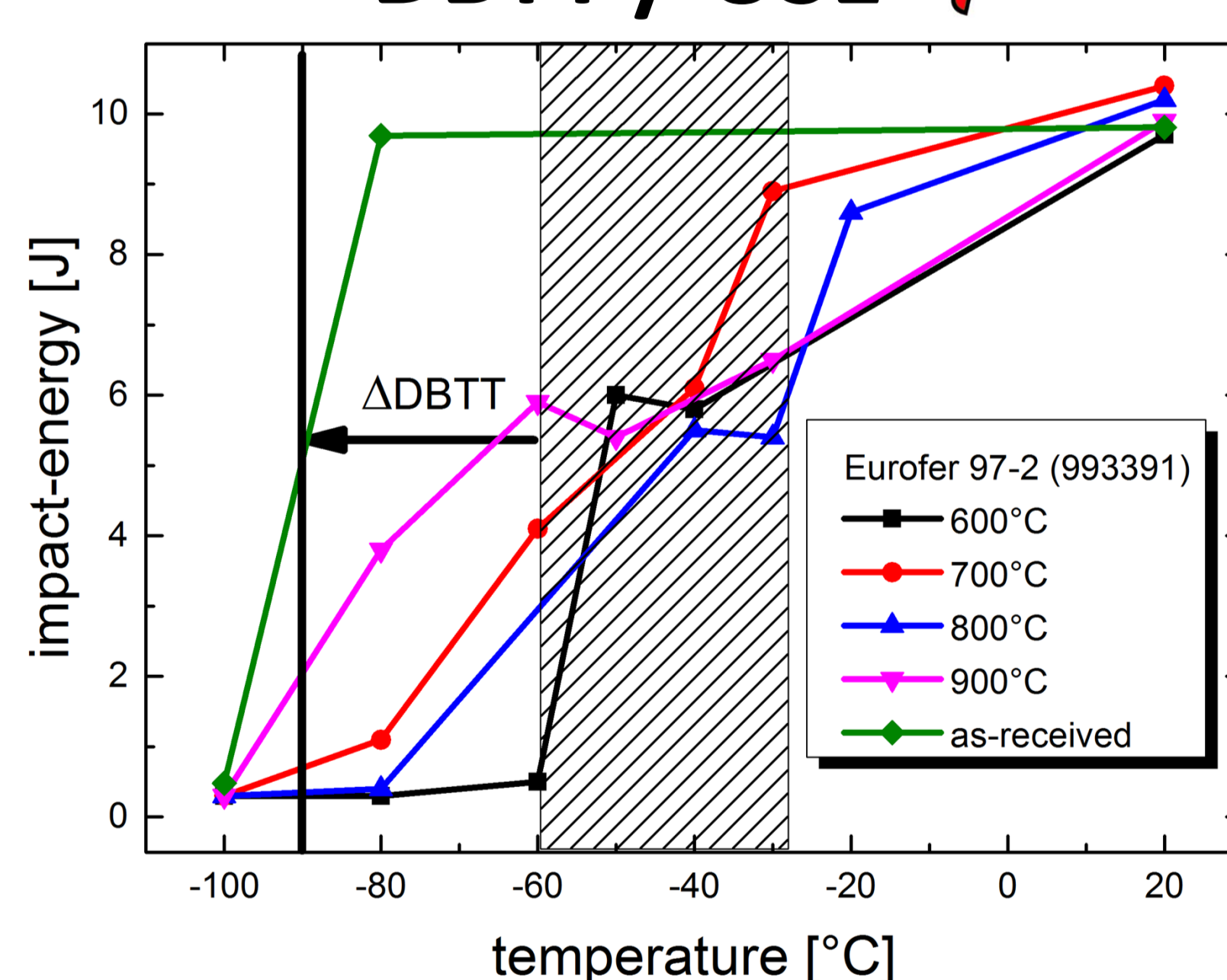


Microstructure: large prior austenite grains and fine martensite laths

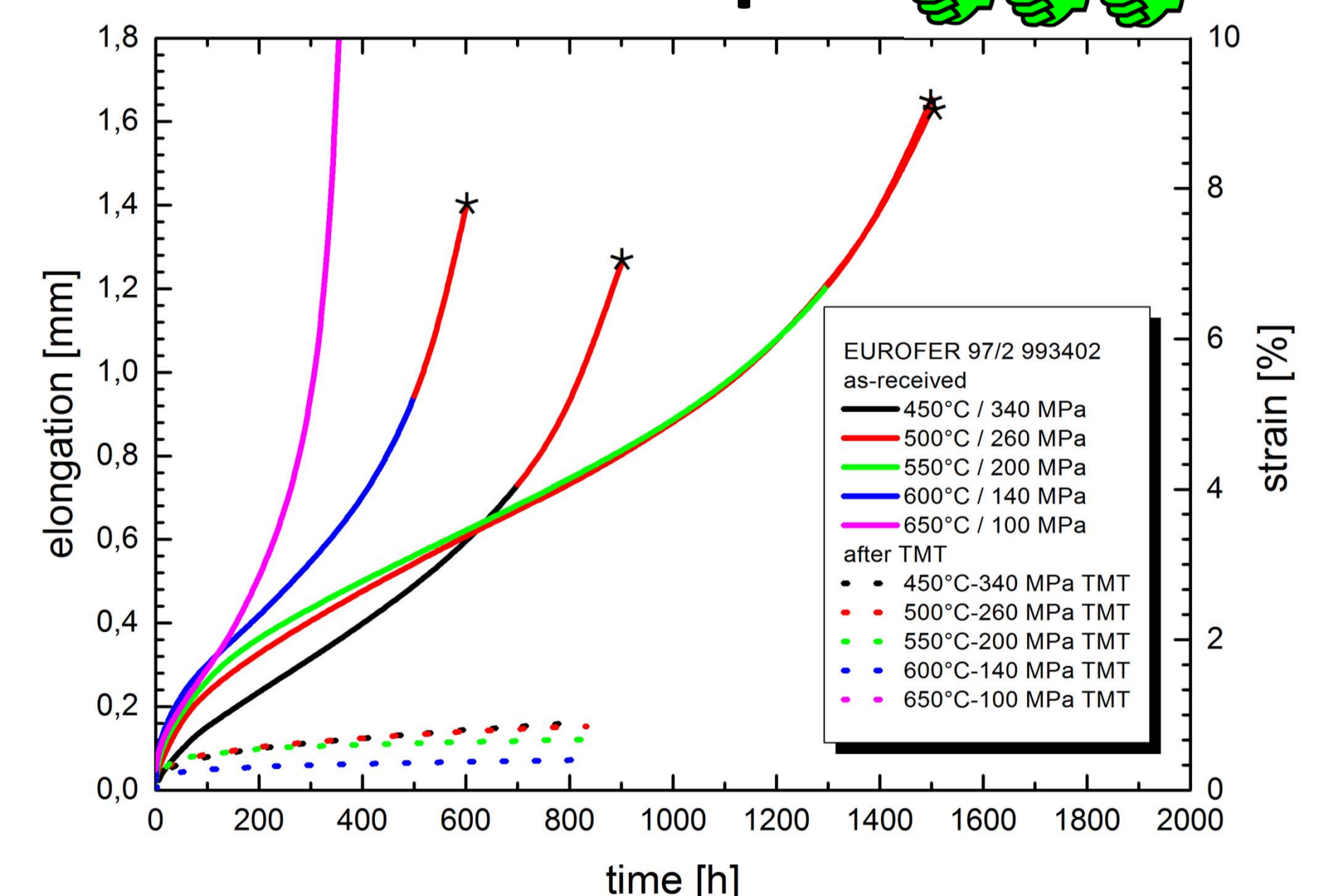
Yield strength



DBTT / USE



Creep



Conclusions:

TMT leads to a shift in mechanical and microstructural properties:

- Ausforming at 900°C is the most effective way to refine the microstructure and distribution of the secondary phases.
- The high solution treatment at 1250°C leads to a full dissolution of all carbo-nitrides.
- PAG size is very large due to dissolution of TaC
- Creep Tests are still running, preliminary results look very promising.