

Symposium N: New materials containing stable and metastable austenite phase

Scope of the symposium

Many of the recent developments in structural ferrous materials rely on the presence of the microconstituent austenite, the FCC iron phase, in order to obtain the increased toughness, or ductility needed to compensate for the increased strength achieved by modern processing. The austenite microconstituent is not thermodynamically stable at room temperature in low alloy steels and cast irons, so it has to be stabilized by supersaturating with C or N interstitial solutes, while inhibiting or retarding the precipitation of equilibrium carbides or nitrides.

This mechanism is the basis for a large range of new materials and thermal and thermochemical processes, as for example the "expanded austenite" layers obtained by carburizing or nitriding at low temperatures chromium containing steels, the carbide free bainite (also known as "ausferrite") microconstituents found in Si or Al containing steels and cast irons isothermally treated above the M_s , the MA constituent and retained austenite present in microalloyed thermomechanically processed and TRIP steels, in "Quench & Partition" steels and cast irons and in TWIP steels.

Another source of room temperature austenite comes from the reverse transformation of martensite during tempering at high temperatures of high toughness Ni containing steels: maraging, steels, super-martensitic stainless steels, Fe-Ni-C alloys for cryogenic applications, blast-proof steels for military ships, etc.

The symposium will be interested on papers dealing not only with the properties, characterization and processing steels and cast irons in order to obtain suitable distributions of the austenite constituent, but also with the effect of cryogenic treatments and of strain and stress driven transformations on this metastable austenite.

Abstracts will be solicited in (but not limited to) the following topics:

- Stable and metastable austenite layers in nitrided and carburized steels.
- Relationship between interstitial solute content and metastable austenite lattice parameters of steels and cast irons, in the presence of elastic stresses.
- Cryogenic treatments and retained austenite in steels and cast irons.
- Stress and strain induced transformation of the metastable austenite in steels and cast irons; TRIP and TWIN effects
- Retained austenite and the products of the transformation near M_s : carbide free bainite, "hard-bainite", ADI, isothermal martensite and TRIP steel microstructures.
- The reverse martensitic transformation during tempering of maraging, super-martensitic, Fe-Ni-C cryogenic steels, blast-proof steels for ships.
- The MA microconstituent in microalloyed high strength steels.
- Symposium organizers

Symposium organizers

Hélio Goldenstein (USP, São Paulo, SP, Brazil)

André Paulo Tschiptschin (USP, São Paulo, SP, Brazil)

Invited speakers (tentative list)

Tadashi Furuhashi (Tohoku University, Institute of Metals Research, Sendai , Japan)

Marcel A. J. Somers (Technical University of Denmark, Department of Mechanical Engineering and Rizo Laboratory.

John G. Speer (Advanced Steel Processing and Products Research Center, Colorado School of Mines, Golden, USA

Scientific committee members (tentative list)

Hélio Goldenstein (USP, São Paulo, SP, Brazil)

André Paulo Tschiptschin (USP, São Paulo, SP, Brazil)

Aloisio N. Klein (UFSC, Florianópolis, SC, Brazil)

Carlos M. Lepienski (UFPR, Curitiba, PR, Brazil)

Clodomiro Alves (UFRN, Natal, RN, Brazil)

Fernando Rizzo Assunção (PUC, Rio de Janeiro, RJ, Brazil)

Cesar Luiz Fontana (UDESC, Joinville, SC, Brazil)

Wilson Guesser (Fundição Tupy, Joinville, SC, Brazil)

Dagoberto Brandão (UFMG, Belo Horizonte, MG, Brazil)

Paulo Rangel Rios (Volta Redonda, RJ, Brazil)

Tentative list of financial support for the Symposium

CNPq, FAPESP, FAPEMIG, FAPERJ