Maria J. Santofimia

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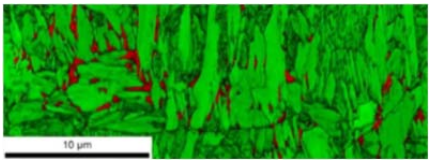
Research interests: Phase transformations, steel, microstructures, microscopy, simulations.

Non-Equilibrium Phase Transformations

Recent Research activities:

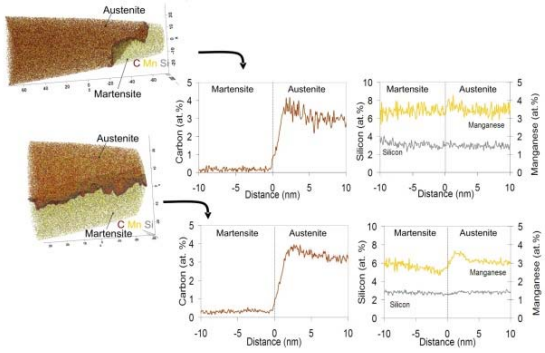
Design and Characterization of Advanced High Strength Steels

Knowledge on phase transformations in steels allowed the design of AHSS for optimum delivery of mechanical properties, including chemical compositions and processing routes. In particular, steels based on the Quenching & Partitioning (Q&P) processing route. Different techniques were developed for their accurate characterization.



[Microstructure of a Q&P steel]

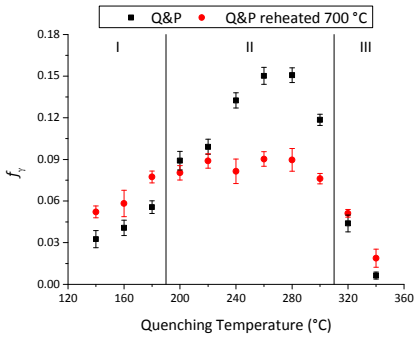
Theoretical and experimental investigations on the mobility of martensite/austenite interfaces were performed. Velocity and direction of interface migrations were found to depend on the character of the interface, chemical composition and the size of grains sharing the interface.



[Atomic analysis of elements across martensite/austenite interfaces]

Performance of AHSS: Retained Austenite

Retained austenite is a key structure in AHSS due to its contribution to the strength of the material through the TRIP effect. Investigations were performed in collaboration with Prof. Kip Findley, from Colorado School of Mines (NSF-ERC program).



[Retained austenite in a Q&P steel before and after reheating to 700°C. MSc Thesis of T. Koopmans, 2015]

Key publications (2015)

[1] F. HajyAkbary, J. Sietsma, A.J. Böttger, M.J. Santofimia. "An improved X-ray diffraction analysis method to characterize dislocation density in lath martensitic structures" *Materials Science and Engineering A* 639 (2015) 208-218.

[2] D. de Knijf, M.J. Santofimia, H. Shi, W. Xu, C. Fojer, R. Petrov "In-situ austenite-martensite interface mobility study during annealing" *Acta Materialia* 90 (2015) 161-168

[3] X. Ou, J. Sietsma, M.J. Santofimia "Molecular dynamics simulation of effects of FCC/BCC interfaces on the nucleation and growth of martensite in iron" *Proc. Int. Conf. in Solid-Solid Phase Transformations in Inorganic Materials 2015 (PTM 2015)* pp. 817-824.

Other Achievements:

[1] Mechanical properties of Q&P steels (F. HayiAkbari, PhD finished in 2015)

[2] Model for bainite kinetics (A. Ravi, PhD student).

[3] Effect of martensite formation on bainite kinetics (A. Navarro-Lopez, PhD student).