Project summary

Electric mobility is a central theme in EC transport policies, and the efficiency of electric motors is one of the main points. Magnetic characteristics of FeSi electrical steels, used in the core of electric machines, influences the electric motors efficiency. The innovative project idea is to prevent fine precipitation, developing an unconventional chemical composition of the alloy with unusual high concentration of Ti, V, Nb, which can act as "scavengers" for N and C, capturing them in coarse precipitates which are believed to be less detrimental for the magnetic steel performances. Optimizing chemical composition and processing conditions, precipitation can be drastically decreased, and magnetic characteristics improved, allowing European steel producers to obtain high quality steels for efficient electrical mobility.

The STeELS_EM project aims to improve the magnetic quality of electrical steels used in the automotive sector by reducing fine precipitates, which interfere with magnetization processes and negatively affect grain growth, preventing the obtainment of the optimal grain size. In sparse coarse precipitates they should improve the “electrical steel” performance.

The objectives of STEeLS-EM project are:

1) to refine the alloy design for NGO electrical steels, in order to predict the chemical composition of precipitates and their evolution as a function of the production cycle of the steel.

2) to assess if ThermoCalc, MatCalc, JMatPro can be used to predict thermodynamic and kinetic evolution of 2nd phases precipitation.

3) to verify if stabilizing elements have a positive effect on electrical steel's magnetic domain structure, microstructure, precipitation, and texture.

4) to refine the alloy design for NGO electrical steels, in order to predict the chemical composition of precipitates and their evolution as a function of the production cycle of the steel.

5) to improve the quality of NGO electrical steel produced in Europe through dissemination of knowledge.