Small Angle Neutron Scattering (SANS) is a key tool in material study at nanoscale. This method allows characterization, in a non-destructive way, of small particles precipitates, pores, cavities) ranging in size between 1 and 100 nm. It is based on the principle that an initially parallel neutron beam is scattered by heterogeneities of the studied sample. These heterogeneities can be due to fluctuations in density, chemical composition or magnetization. SANS technique gives statistical data representative of the whole sample. It is particularly adapted to the study of steels. Indeed, neutron radiation often offers advantageous contrasts between the chemical elements constitutive of industrial steels which are close in the periodic table (Fe, Cr, Mn, Cu, Ni...) or light (C, N, O, H).

In several studies concerning the ODS martensitic/ferritic materials, SANS has been used to characterize finely the nanometric Y2O3 oxides distribution in the matrix at various stages of the development process. Furthermore, in this case of ferromagnetic materials, the magnetic scattering analyse allows to obtain informations about the chemical composition of the aggregates. We will present the results obtained on different commercial (MA957, PM2000, 12YWT) and experimental ODS steels in correlation with the creep-rupture properties. Then, a study of the milling conditions (different kind of mills, energy, initial compounds: yttrium rich intermetallic compounds or yttrium oxides with a Fe-Cr matrix) on the oxides distribution will be shown.

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