In-situ XRD studies of microstructural changes in steel

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In-situ XRD experiments allow to investigate microstructural changes at elevated temperatures and to collect large amounts of data in a short time. In order to carry out such measurements a XRD with area detector was equipped with a commercial heating stage. The aim is to determine the range of possible in-situ XRD applications and to optimize the measurement and evaluation procedures for steel samples. For this task, changes in phase composition, texture, dislocation density and stacking fault density are investigated in order to study the kinetics of the underlying processes of phase transformation, recrystallization and recovery. The annealing atmosphere has a strong influence on the measurements due to surface oxidation or decarburization. Means to reduce the residual oxygen content in the atmosphere and to protect the sample surface by a thin coating are discussed.