**Interaction of dislocations and elastic strain measured by TEM around nanoprecipitates in Al alloys**

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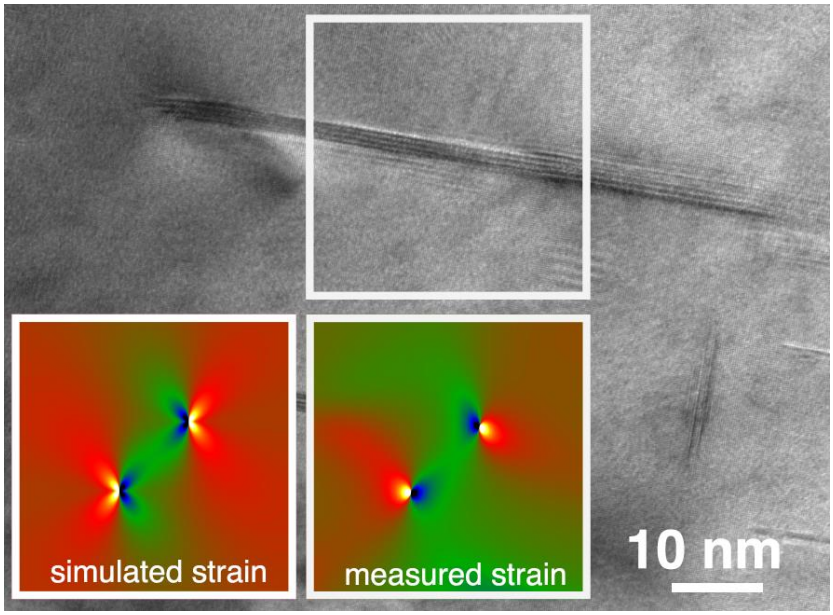
Precise measurements of the strain fields around small precipitates embedded in a Al crystalline matrix can be obtained from Cs-corrected high-resolution transmission electron micrographs using the geometric phase analysis. Such analyses are well designed for structurally-hardened materials to study the influence of the precipitates on the matrix, the location of the dislocations in the matrix in the vicinity of the precipitates, and the interplay between dislocations and precipitates of structurally hardened materials. It is exemplified here in the case of two aluminum alloys of the 2xxx series.

In the 2198-Al alloy, the determination of the strain field closely surrounding T1 precipitates show that nucleation of such precipitates is intimately related to the initial existence of dislocations in the matrix. In the 2219-Al alloy, θ' precipitates appear as strong barriers to dislocations motion and this can be correlated to the measurement of the strain field generated in the Al matrix by the precipitates and the observations of dislocation loops surrounding the precipitates.




Measured strain compared to simulated strain pointing out the existence of a dislocation loop surrounding a θ' precipitate in Al-2219.