

Supplementary information:

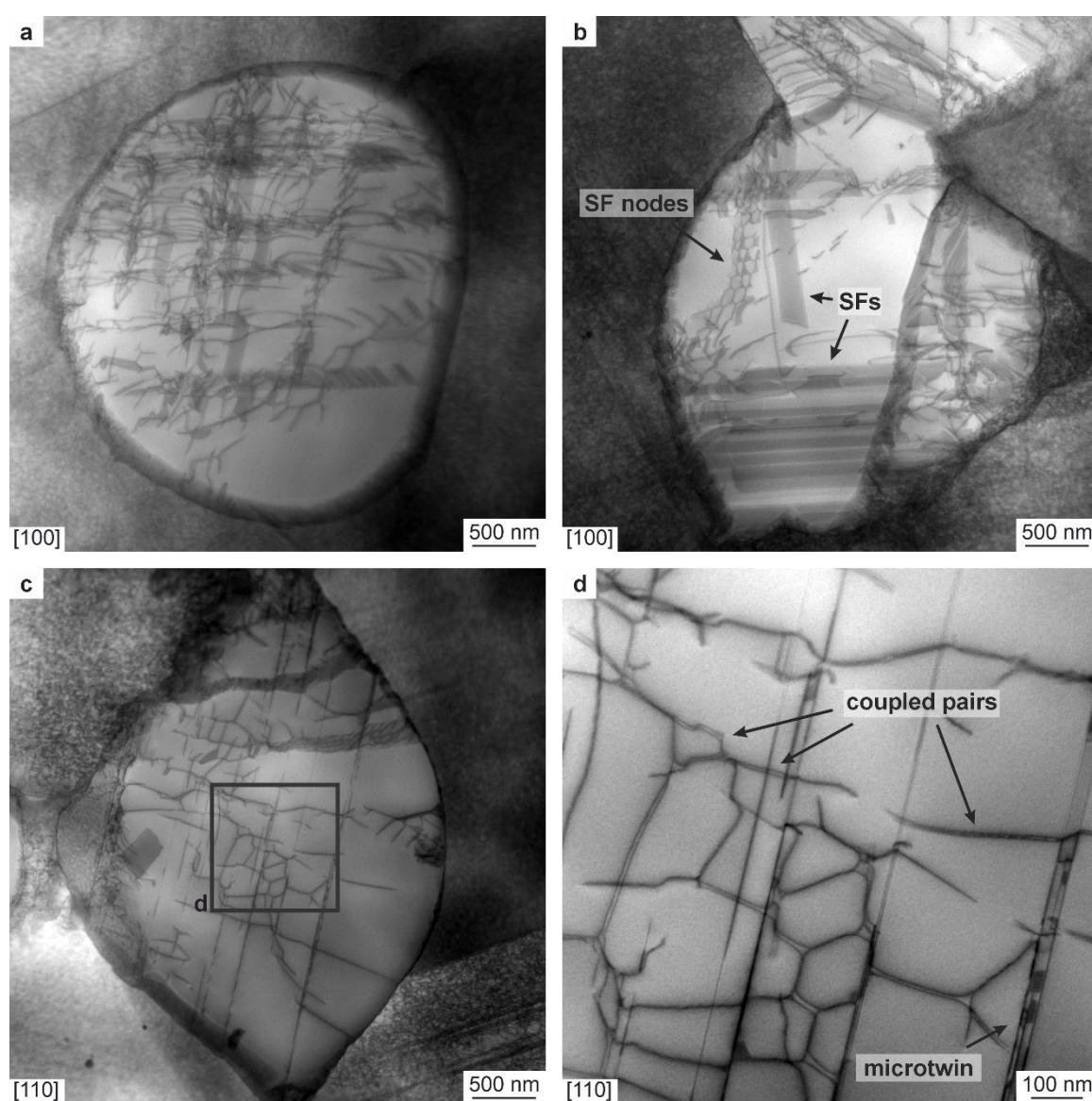
Influence of Ti and Ta on deformation, segregation, and ordering kinetics in polycrystalline CoNi-based superalloys

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Supplementary Figure 1: (a-d) Defect structures in primary γ' in Udimet720Li after creep deformation 750 °C and 800 MPa. Images were taken along [100] or [110] zone axes. Note that the dislocation networks consist of coupled dislocation pairs. Additionally, stacking faults and microtwins are forming as well.

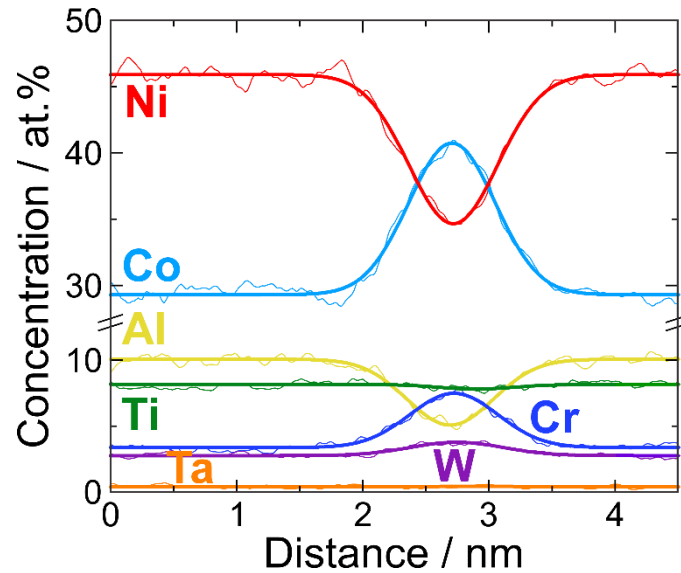
Supplementary Note 1

As mentioned in the Methods section, elemental segregation was quantified by fitting Gaussian functions to the vertically integrated line profiles perpendicular to the planar faults. The fitting was performed using the following function:

$$y(x) = y_0 * A * e^{-0.5\left(\frac{x-x_c}{w}\right)^2},$$

where $y(x)$ is the element concentration at position x , y_0 is the concentration of the surrounding γ' phase, A is the segregation amplitude, x_c is the spatial center of the fault and w is the width of the segregation profile.

To ensure statistical robustness, particularly for minor elements (e.g., W, Ta, Ti) that may exhibit lower signal-to-noise ratios, the following procedure was applied. First the profiles of the major segregating elements (Co and Ni) were fitted unconstrained as they exhibit the most pronounced and well-defined segregation peaks. Subsequently, the peak position and peak width parameters of the other elements were constrained based on the obtained results from fitting the Co and Ni profiles, allowing a maximum deviation of 0.1 nm and $1 * 10^{-10}$, respectively.



Supplementary Figure 2: Example of integrated EDS line profiles perpendicular to an SESF in CoWAlloy5 (interrupted after 38 h at 750 °C / 800 MPa, 2% plastic strain) and their Gaussian fits as described above.