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# Formation of Disordered Nano Particles and Their Influence on the Elevated Temperature Deformation of High Entropy Superalloys

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The combination of FCC-structured matrix phase ( $\gamma$ ) with high fractions of coherent L12-structured precipitates ( $\gamma'$ ) of Ni-based superalloys has proven to be an effective microstructure template against deformation at elevated temperatures. We have developed Ni-rich high entropy alloys (High Entropy Superalloys (HESAs [1-3])) which possess a similar microstructure by balancing the chemical composition and adding elements that are not common in cast Ni-based single crystal superalloys, such as Fe and Ti, with the aim of further decreasing the cost and density of these alloys. Interestingly, precipitation of nano sized particles can be identified within the L12-structured  $\gamma'$  in HESAs, and these nano particles can increase the yield strength and creep resistance of HESAs at elevated temperatures. To elucidate the mechanisms of nano particle formation and strengthening contribution, detailed experimental analysis and simulation have been conducted to show that these nano particles have high entropy compositions, and their presence can provide hindrance to superdislocations, thereby contributing towards strength enhancement at elevated temperatures.

## References

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