In-situ Electron Back Scattered Diffraction of SS316L

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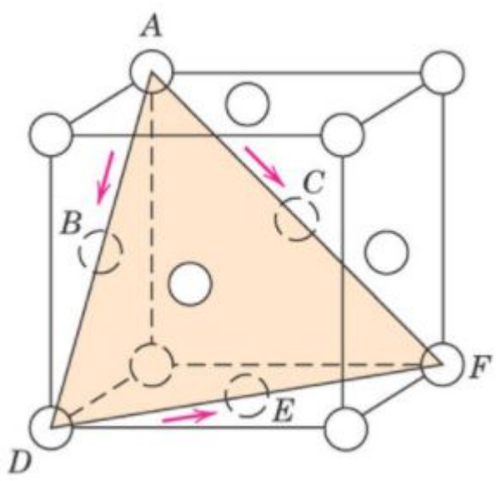
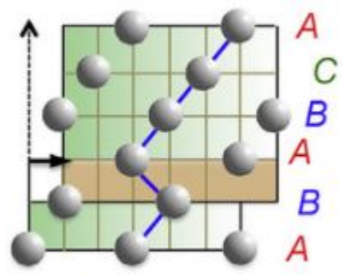
INTRODUCTION

- SS316L : Austenitic stainless steel with C<0.03%
- Offer high tensile strength, Good ductility
- Excellent corrosion resistant
- Application: Petrochemical industries, Nuclear materials

Deformation of SS316L (FCC)

- 12 slip systems {111}<110>
- 12 twin systems: {111}<112>





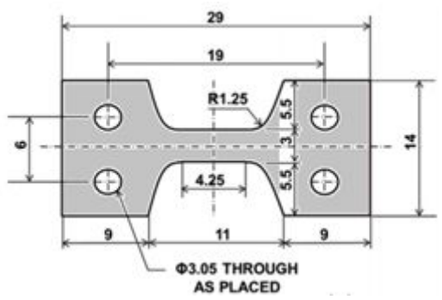
Intrinsic stacking fault

OBJECTIVE

To study the evolution of microstructure and texture with deformation of SS316L and simulate it using DAMASK

METHODOLOGY

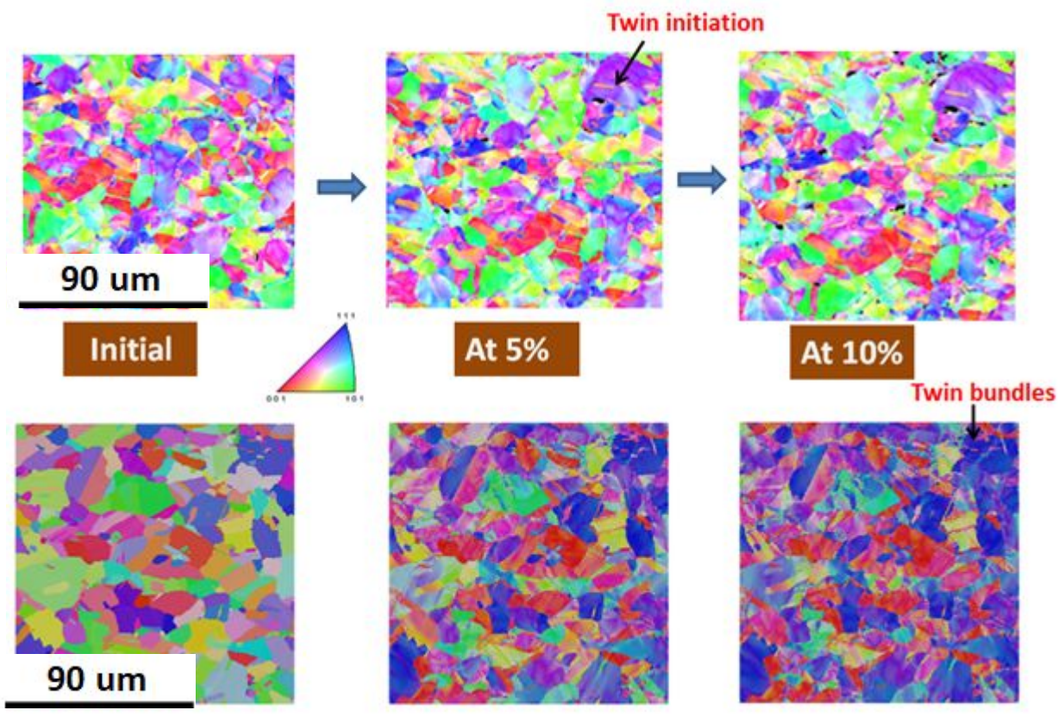
- SS316L in-situ sample
- Deformed at strain of 5%,10%,20% and 40%



Insitu sample
(Dimensions are in mm)

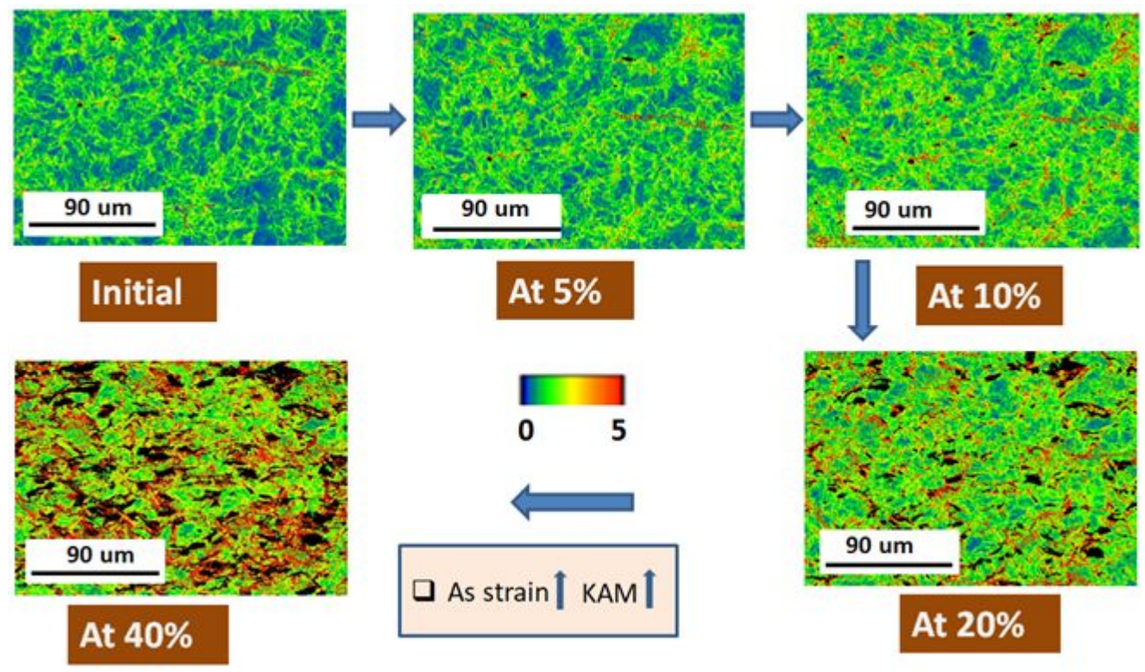
RESULTS AND DISCUSSION

IPF Map: Experimental vs Simulation

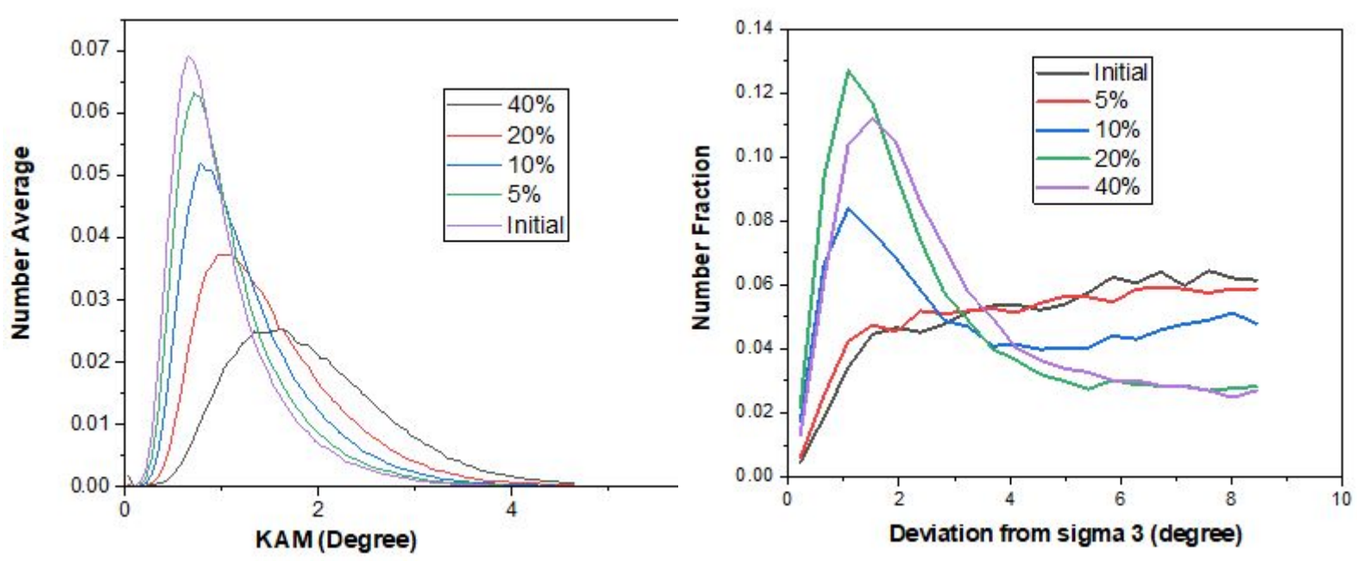


- Inverse pole figure map indicates twin initiates at 5%strain
- Twin bundles are observed at strain of 10%

KAM Map

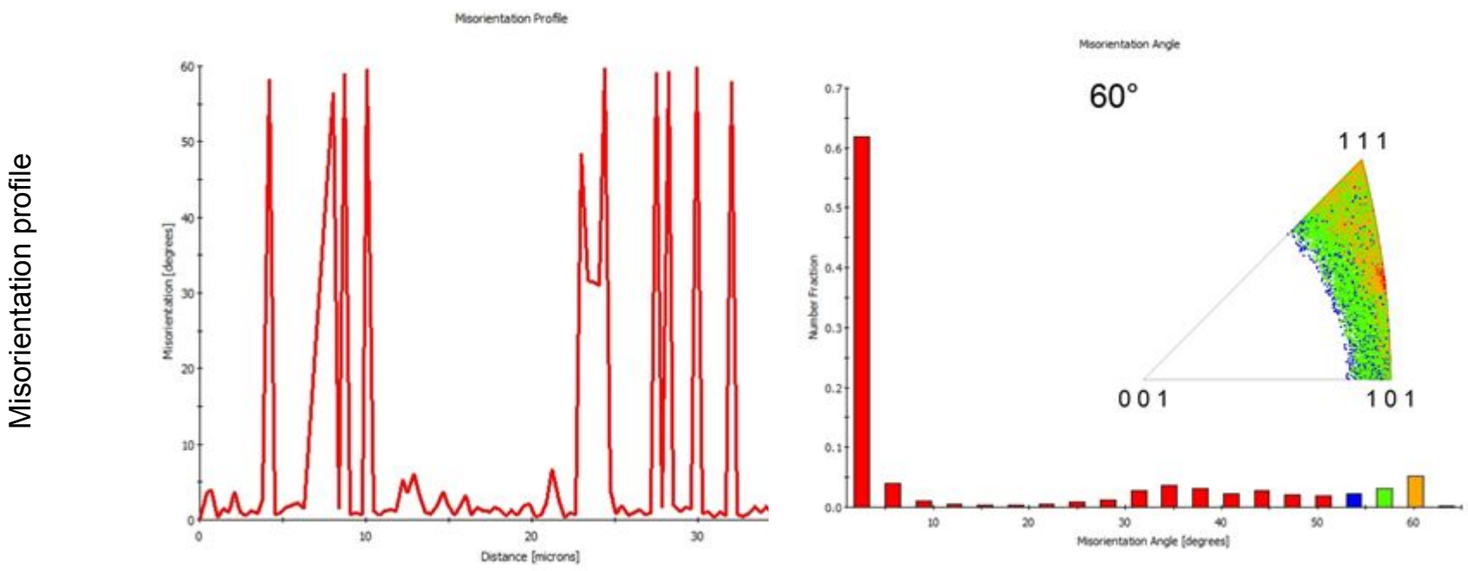


KAM and CSL deviation plot

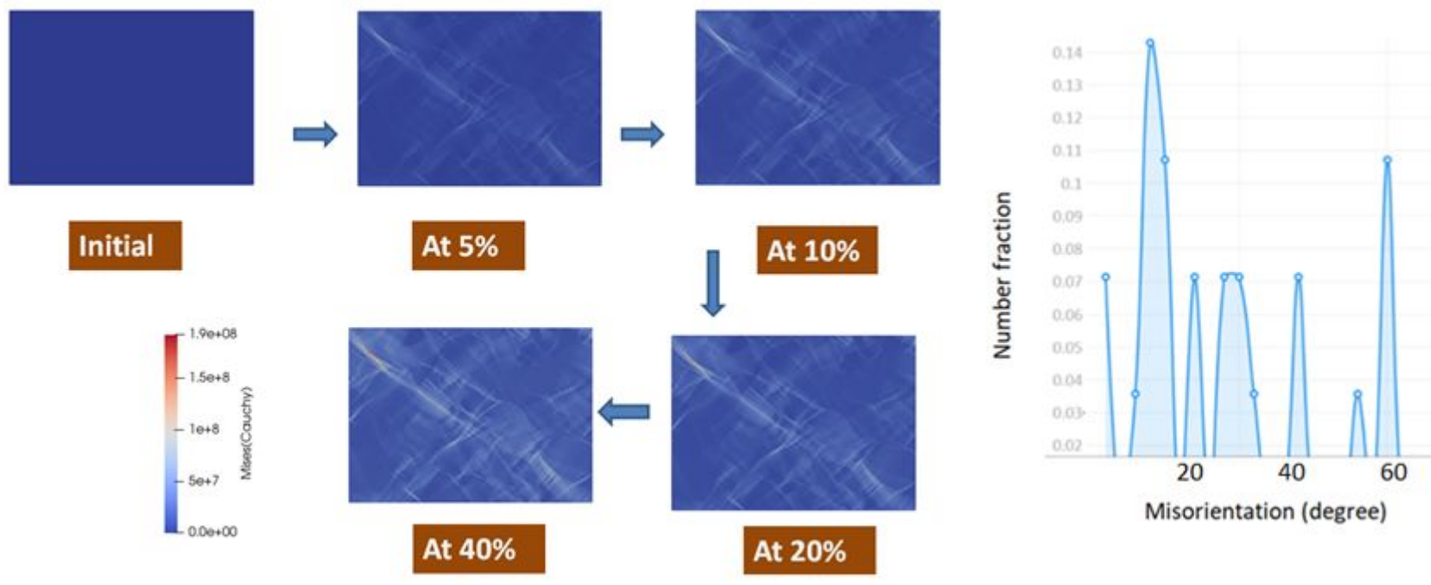


KAM and CSL deviation from sigma3 of 40% deformed sample is highest

Misorientation profile



Von-Mises strain distribution map



SUMMARY

- Deformation of SS316L reveals twin starts nucleating at a strain of 5% and eventually twin bundles are formed at higher strain
- Misorientation profile depicts presence of twins at 60 degree about (111) plane

ACKNOWLEDGEMENT

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