**Dynamic strain aging**

**Wenqi Liu**

# Summary

The dynamic strain aging (DSA) effect is widely investigated since the mid-20th century, as it strongly affects the mechanical property including strength and ductility of metals. With the development of modern steel and experimental techniques, the investigations on DSA are enhanced in recent decades. The understanding of the DSA mechanism becomes more and more important as the DSA-related phenomena take place in many commercial-grade steels and various applications, which always bring detrimental performance during steel serving. A study on ferritic steel also identifies the effect of screw dislocations in DSA. It was pointed out that the jerky flow behavior at low temperatures was caused by the conventional Cottrell dislocations-carbon atoms interaction, while the serrated flow curves at high temperatures were due to the strong interaction between screw dislocations and carbon, which could result in the straight screw dislocation lines. The straight dislocation lines and the even linear dislocation cell structure are also observed in the study. The cellular structure as well as the straight and parallel dislocation arrays are observed in ferritic stainless steel at all testing temperatures. However, at DSA temperatures, there are distinctly higher dislocation density, clear straight dislocations lines, less cellular structure but dense dislocation walls/tangles, which indicate the restricted dislocation substructure rearrangement and enhanced dislocation multiplication caused by DSA. This specific behavior is often referred to as the blue brittleness. It is also a phenomenon from the DSA effect, but a clear physical and quantitative explanation of it is still missing in the current literature.

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# Literature

Caillard, D., Dynamic strain ageing in iron alloys: The shielding effect of carbon. Acta Materialia, 2016. 112: p. 273-284.

# Statement

* *Indicate your group member (If any). Clearly state the individual contributions of each group member.*

# Attachments

* *Attach the original literature file.*