Computer simulation of growth stresses in polycrystalline thin films

J.S. Tello, A.F.Bower, E. Chason, B.W. Sheldon

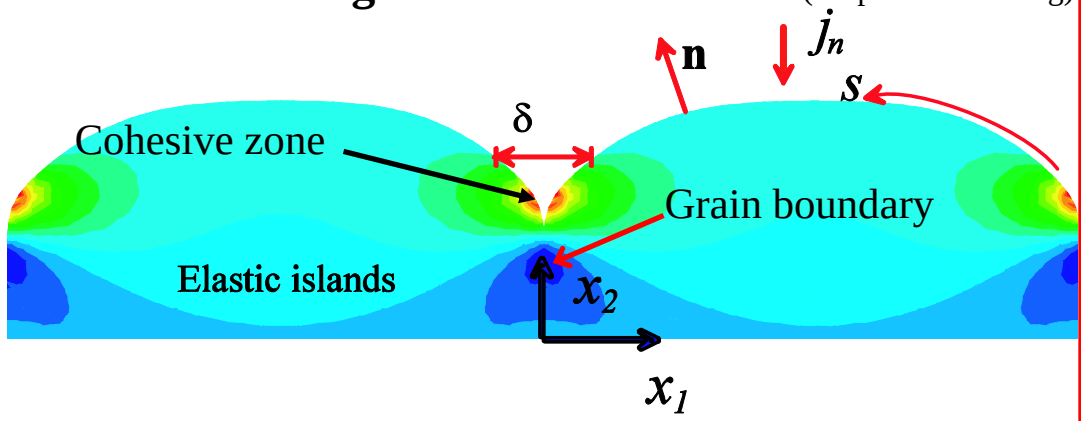
Project overview

Growth stresses up to 1 GPa can develop during deposition of a thin film.

The stresses often cause failure, so there is a need to understand their origin and to develop methods to control them.

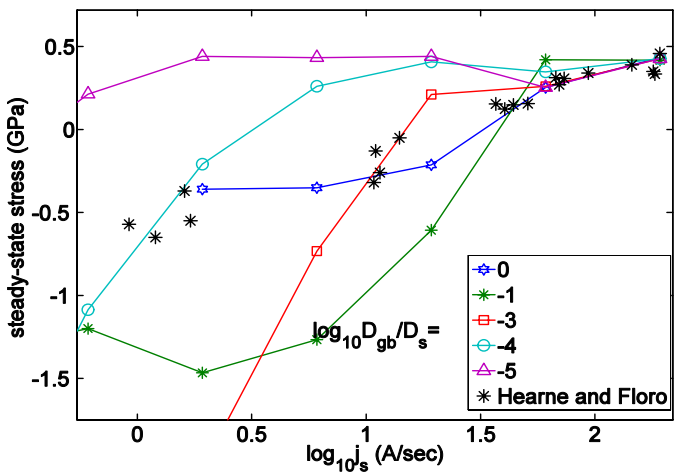
Computer simulations predict how stresses evolve during growth, and to predict the influence of growth conditions on the magnitudes of the stresses

2D FEM modeling w/ surface diffusion (adaptive remeshing)

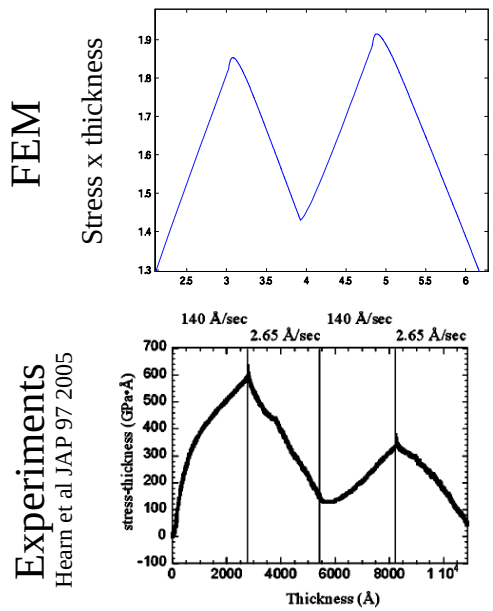


Steady-state stress vs growth flux

For different material models



Growth flux alternation



Stress x thickness vs thickness