# New Insight into Early Growth of Solid Thin Films

## *Evidence shows film evolution follows liquid-droplet theory*

## Scientific Achievement

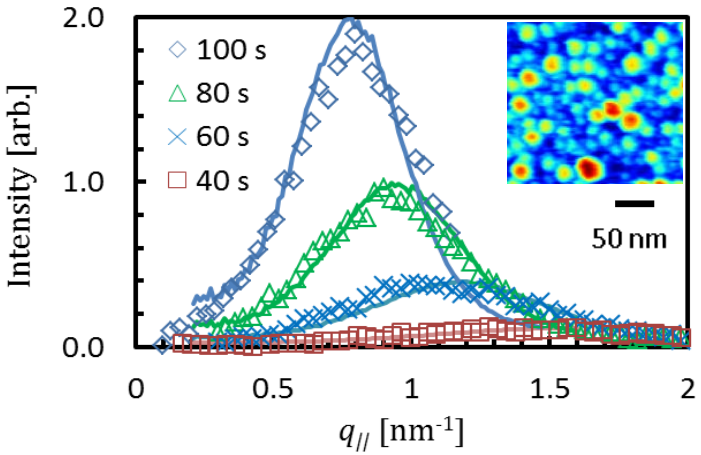
**An x-ray study of an aluminum thin film grown on two surfaces suggests that early growth aligns with a theory developed for the deposition and coalescence of liquid droplets**

## Significance and Impact

**Results suggest that other thin films may grow the same way, allowing scientists to better understand the process and, eventually, learn to tailor thin films for new technologies**

## Research Details

- X-ray scattering used to study, in real time, the deposition of aluminum (Al) atoms on silicon oxide and sapphire
- X-ray data and microscope images show that the average geometry -- smaller nanoscale islands dispersed among larger ones as they begin to combine -- looks similar across the growth period, but with length scales increased.
- This agrees with the "Family-Meakin" scaling model for deposited liquid droplets, even though the film is solid, and revises the traditional view that islands are homogeneous and coalesce at about the same time
- Such behaviour could be a widespread phenomenon for solid films grown via island formation and coalescence




Evolution of the x-ray scattering patterns during the vapor phase deposition of Al atoms on silicon oxide. Inset: an atomic force microscope image of the film at the end of the experiment.

L Arslan, C Sanborn, E Anzenberg, K Ludwig Jr, *Physical Review Letters* **109**, 106102 (2012)

Work was performed at Brookhaven National Laboratory