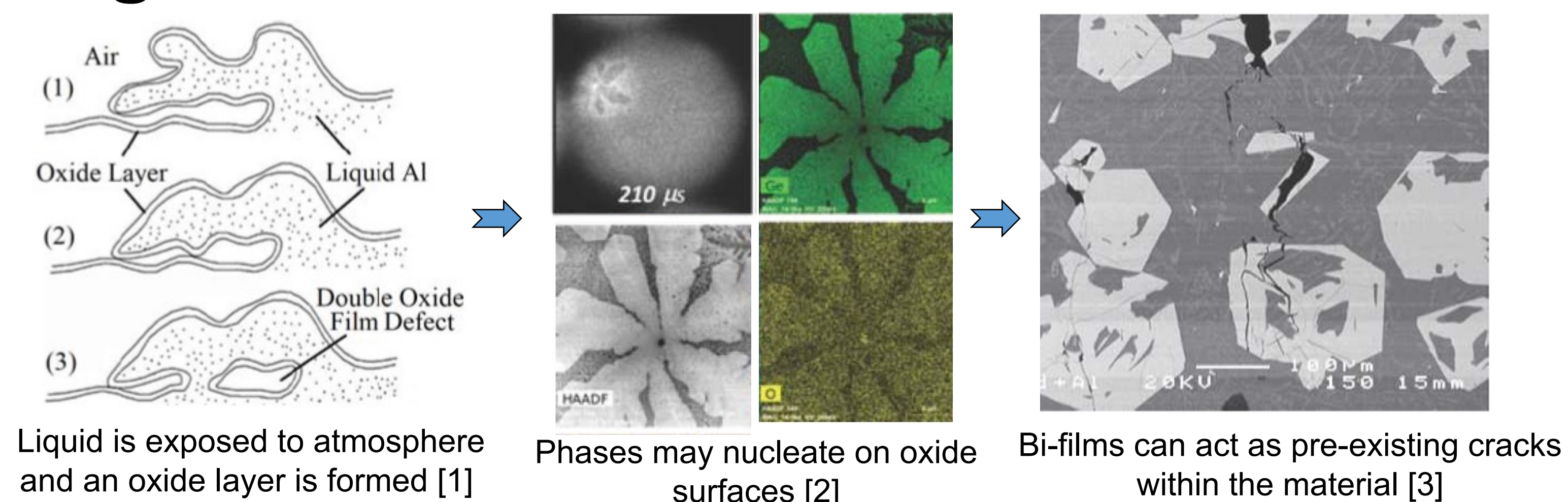


Project 63-L: Experimentally Validating Phase Field Modeling Of Dilute Al-Cu Alloys with Oxide Particles Present

Spring 2022 Semi-Annual Meeting

Student: Spencer Hunt (Mines), Faculty: Amy Clarke (Mines), Kester Clarke (Mines), Mohsen Asle Zaeem (Mines)

Background:



Liquid is exposed to atmosphere and an oxide layer is formed [1]

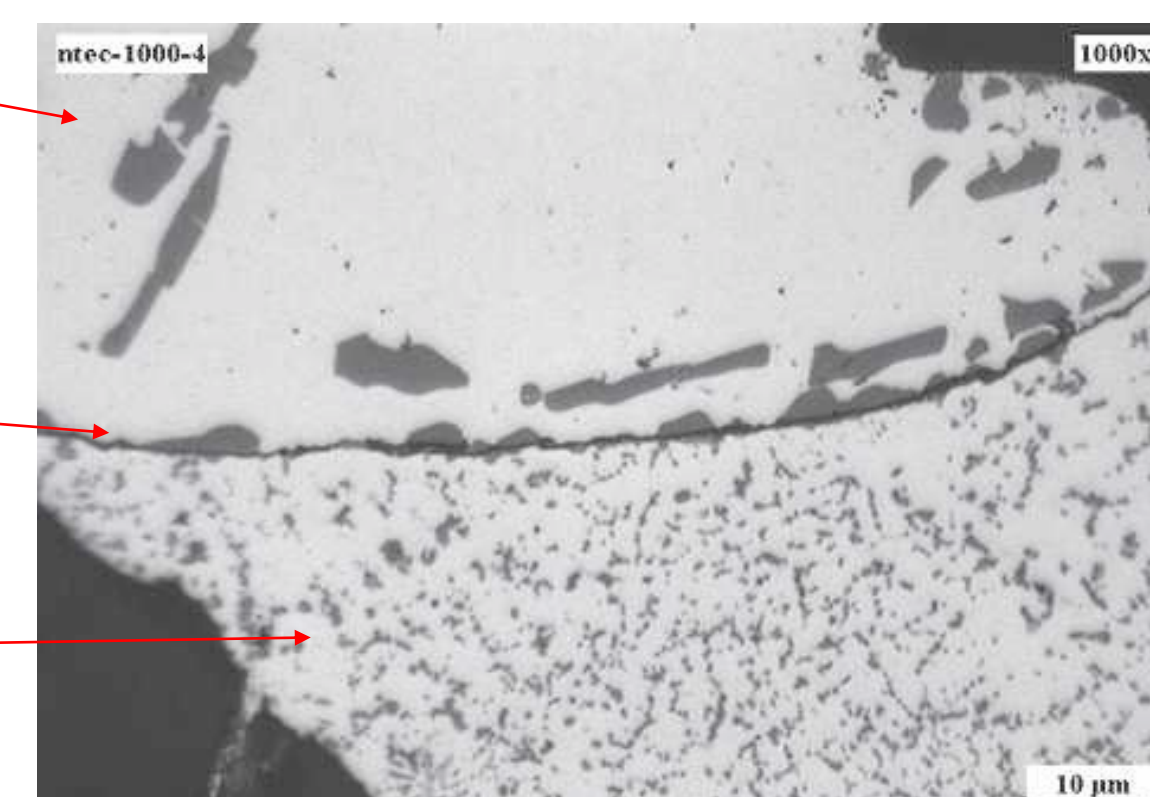
Phases may nucleate on oxide surfaces [2]

Bi-films can act as pre-existing cracks within the material [3]

Fine Grain Structure

Oxide Barrier

Coarse Grain Structure



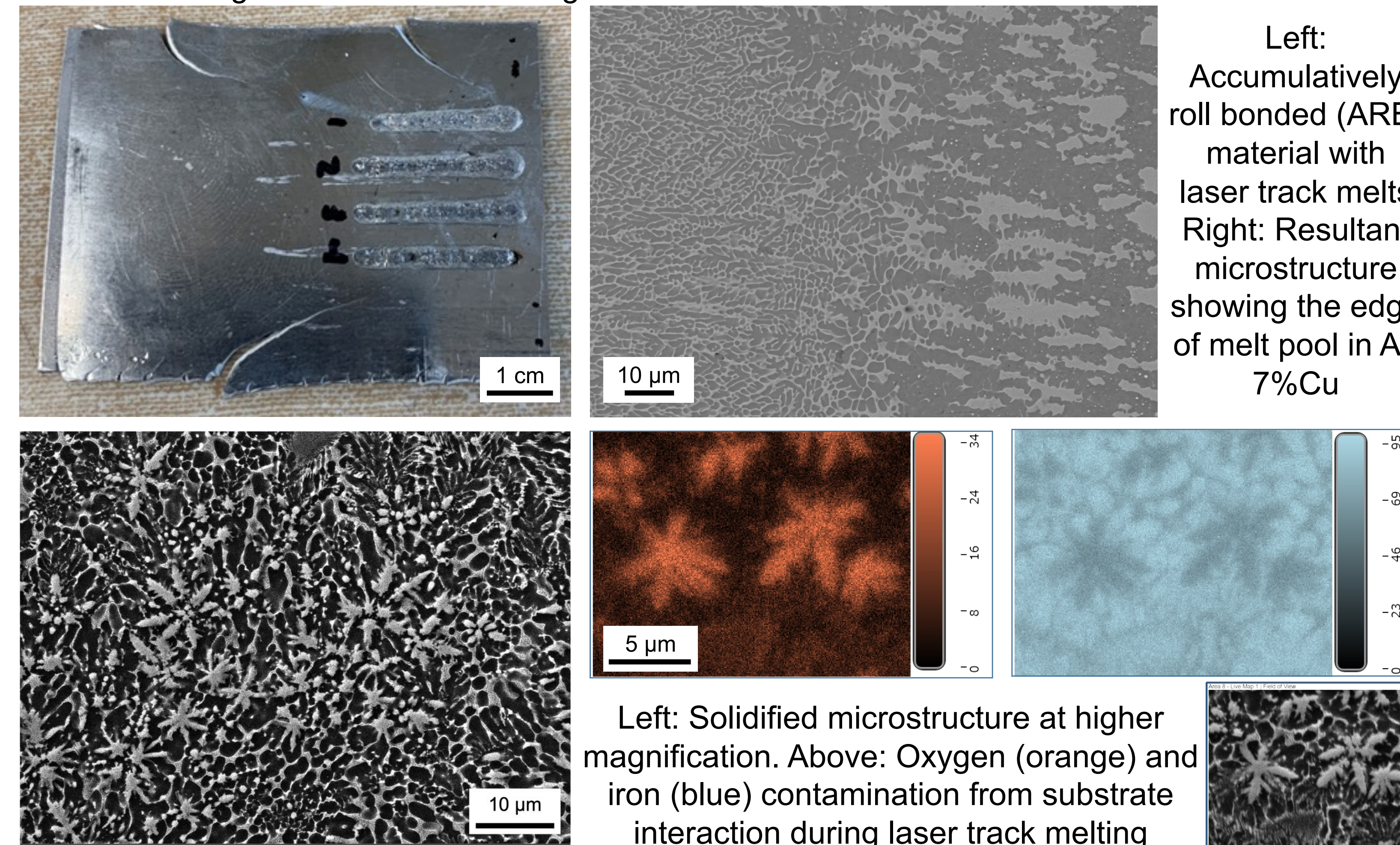
[3]

Goal: Provide improved understanding of how oxides affect solidification microstructure evolution

Relevance: Help mitigate oxide related defects observed in physical castings

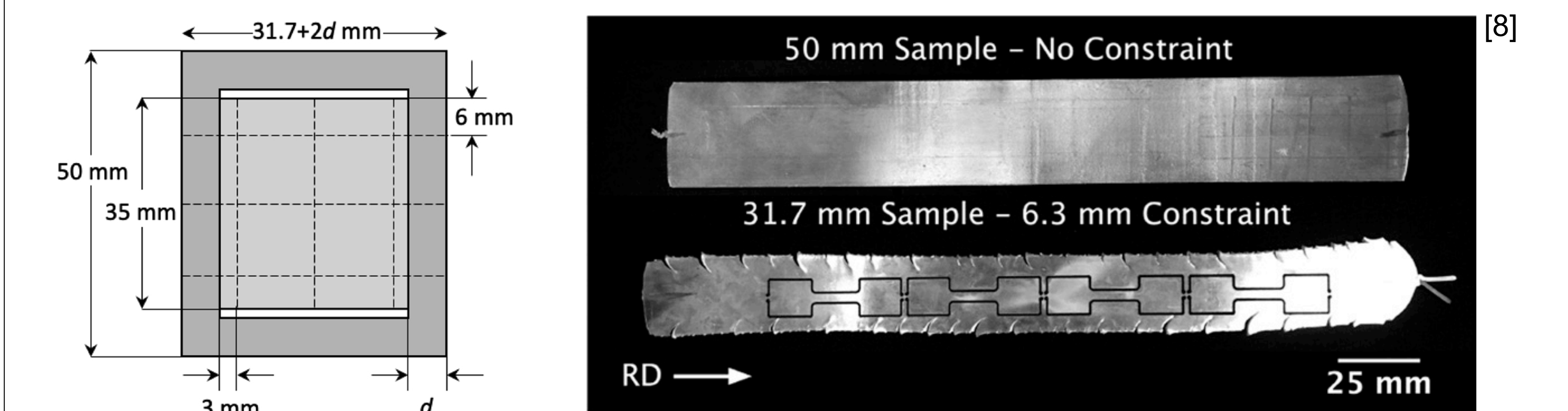
Recent Progress:

Initial roll bonding and laser track melting trials

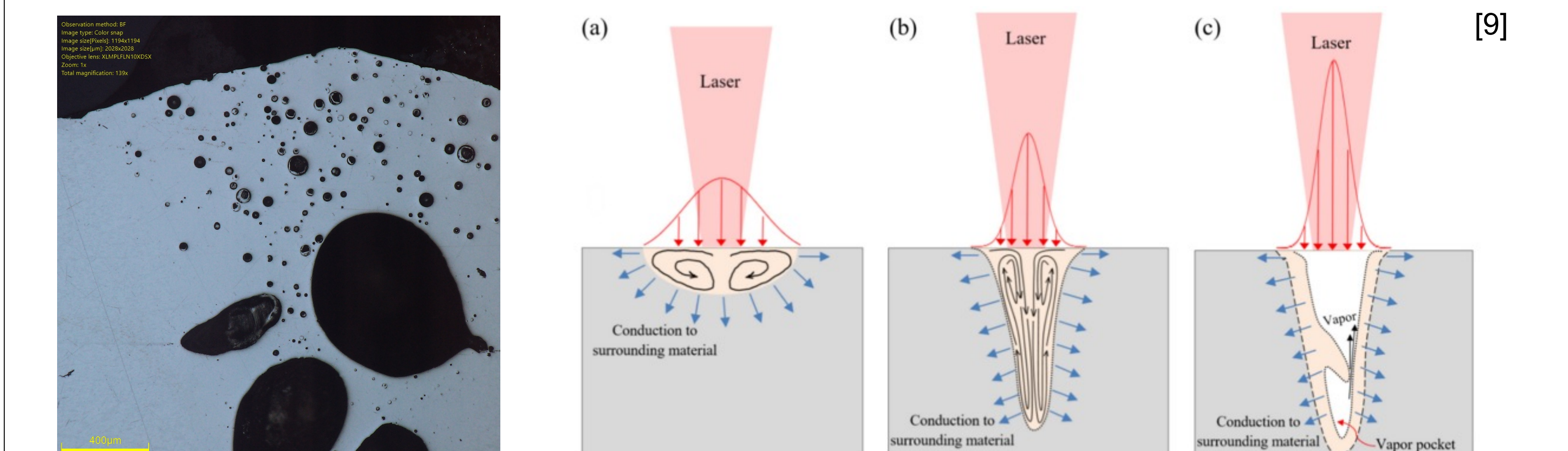


Future Work:

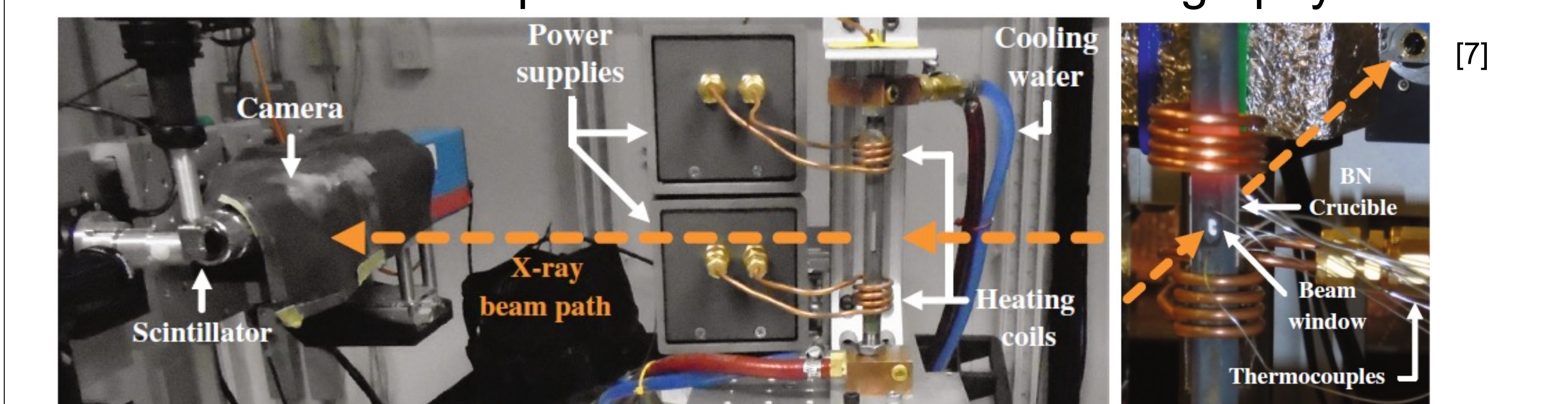
» Mitigate edge cracking during ARB



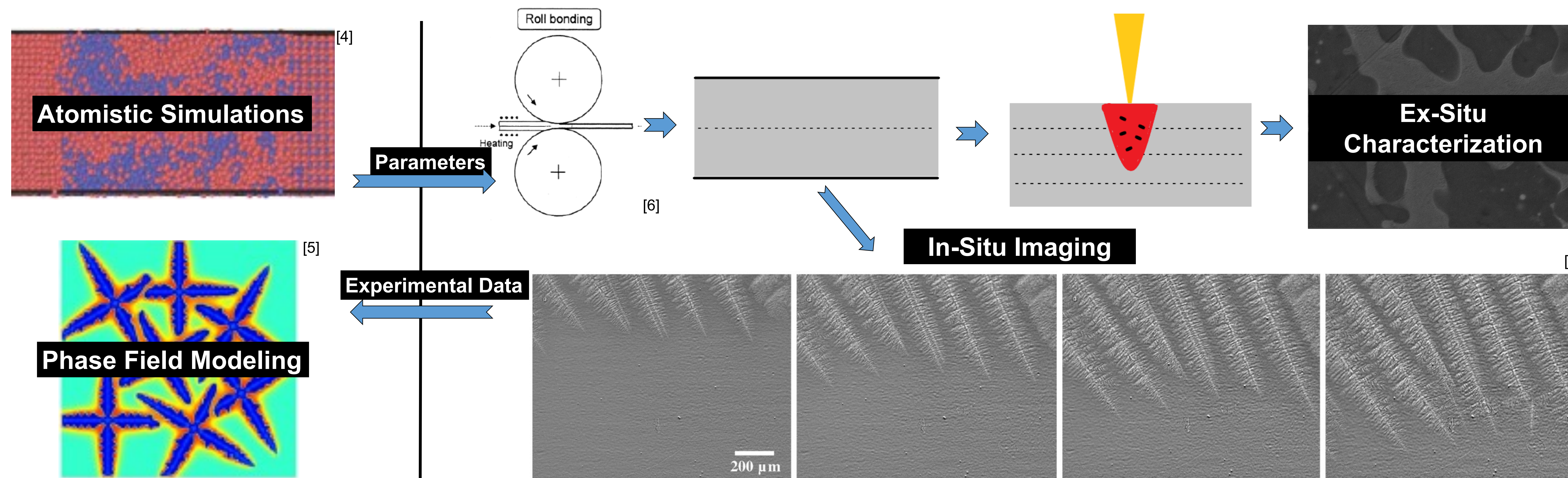
» Operate in conduction mode and produce representative melt pools



» Build a furnace set-up for in-situ solidification radiography



Methods: Creation of oxides in Al alloys for subsequent melting/solidification experiments



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