

TRANSIENT GRATING ALUMINUM ORIENTATION OUTLINE

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1 Introduction

- Desire to have a faster method of determining unknown crystallographic orientation
- UK Group
 - Have velocity mapping method
 - data is experimental and slow
- Want to be able to make measurements faster and back them up with simulations instead of experimental libraries
- Current experimental methods like EBSD, Laue Backscatter diffraction and XRD
 - Big
 - Slow
 - Expensive

2 Background

- Existing methods
- EBSD, Laue, XRD
 - Description of the method
 - Uses
 - Drawbacks as mentioned above
- Newer Ultrasonic Methods
 - UK SAW speed mapping
 - * High power laser pulses
 - * Possibly ablating the materials and damaging the surface
 - Alexei PSAW on silicon study
 - Other people doing similar things?

3 Methods

- Chose Al to study because it is relatively isotropic, if you can detect changes with it then more anisotropic materials should be easier
- Description of the TG methodology
- Calibration with tungsten (as we see it doesn't change with rotation)
- Three figures
 - Photo of TG facility
 - More advanced diagram (solidworks from Mike?)
 - TG analysis image like quals
- Description of analysis methodology
- MD Methodology
 - Whatever Penghui thinks is necessary in here

4 Results

4.1 Molecular Dynamics Results

- Al {111}
- Al {100}
- Cu?

4.2 Experimental Results

- Al {111}
- Al {100}
- W (no change?)
- Want plots of angle versus max propagation frequency for all samples, can even go and back out Young's modulus if we can measure the density.
- At least one temporal and spectral trace (insets?) from representative data from one sample

5 Discussion

- Comparing the MD and experimental data
 - Implications for ease of determining the orientation of unknown crystal substrates
- More anisotropic materials should be easier
 - Is there theory anywhere that would let us make predictions about differing speeds on not only crystal faces but also directions on those faces?
I want to know this anyway
- Uncertainty
 - Can talk about here or just find a convincing way to handle experimental uncertainty and include that in the results section, leaning towards the latter
- New method for qualification of MD potentials?

6 Conclusion