**XRR Demo questions**

CHEM-E4205 Crystallography Basics and Characterization

1. XRR is one of the most efficient techniques for obtaining multiple thin film properties from a single measurement. You are planning to use atomic layer deposition (ALD) technique to grow multiferroic Fe2O3 thin films and you would like to find out the film thickness, density, and roughness of your thin film samples. For a successful XRR measurement, what is the most critical aspect to consider when planning the deposition?
2. You are trying to fit the measured XRR patterns of Fe2O3 thin films but face difficulties in having a proper match. In the three following scenarios (A—C), what would be the most probable way to get a better match for your measured pattern? Remember to justify your answer! The black curve is the measured pattern, and the red curve is the fitted curve.

A graph of a graph of a graph

Description automatically generated with medium confidence

1. The model which describes the basic structure of your sample is shown below. However, often more complex models are required to accurately describe the sample. Discuss with a few sentence, what additional layers could be needed for precise fitting (hint: atmospheric effects, interface)?

|  |
| --- |
| Fe2O3 |
| SiO2 (native oxide) |
| Si(substrate) |