Supporting Information for

Structural, Optical, and Electronic Stability of Copper Sulfide Thin Films Grown by Atomic Layer Deposition

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Phase Diagram

Phase diagrams for the $Cu_{2-x}S$ system has been previously reported by several authors.[28,51]

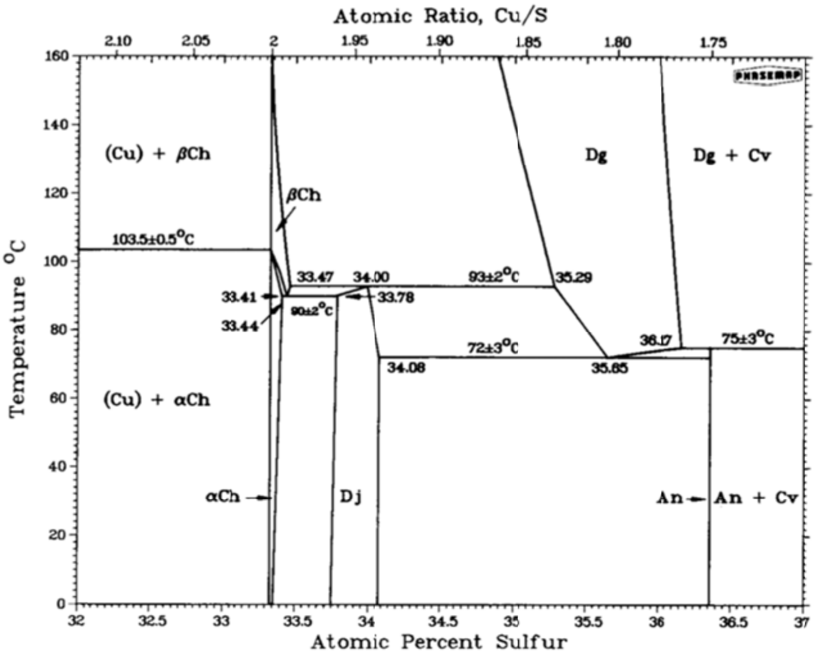

Figure S1. Phase diagram for $Cu_{2-x}S$ from Chakrabarti et. al.[51]

Glovebox Circulation Effects

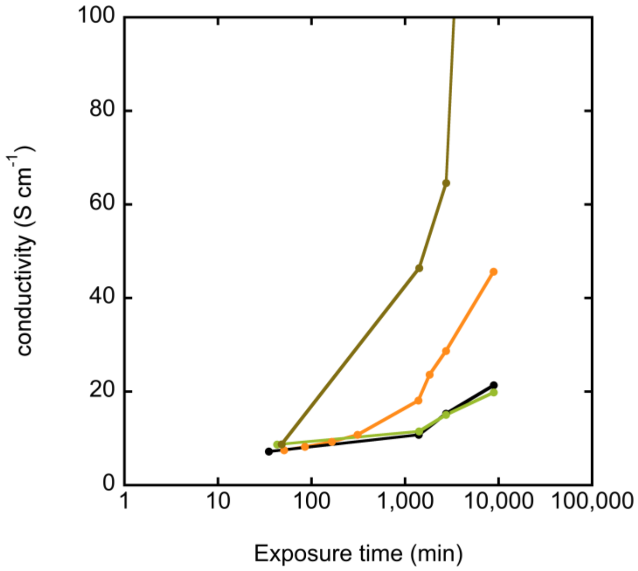

Figure S2. Conductivity of Cu_2S thin films stored under glovebox atmosphere. Thin film exposure to the circulating atmosphere was varied by no containment (brown), containment in the Hall measurement instrument system (orange, not airtight), containment in an airtight plastic box (green), and containment in an identical airtight box plus Al foil wrapping.

In-situ Resistance

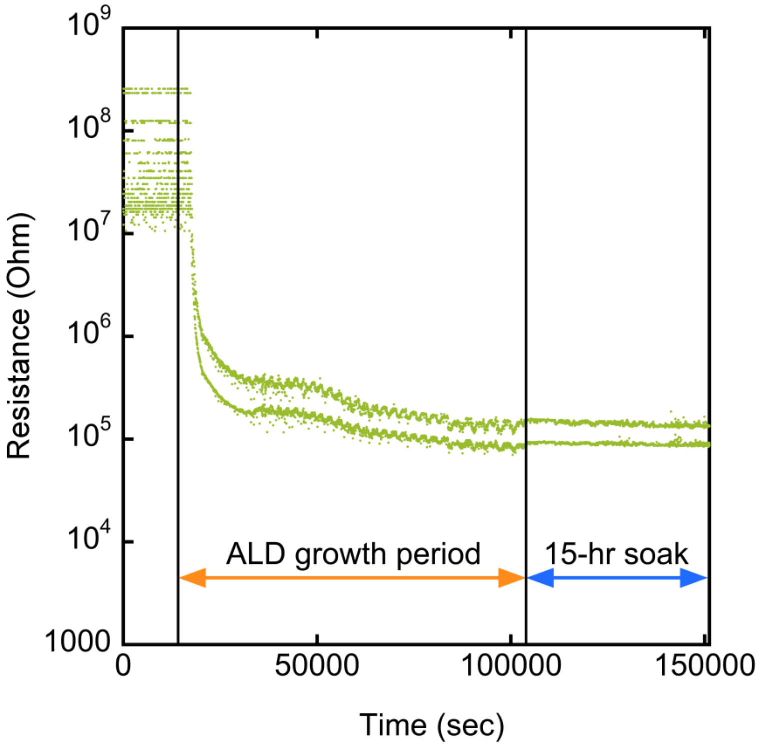

Figure S3. Resistance measured across a glass substrate gap upon coating with Cu_2S by ALD. Two measured resistances are recorded, for positive and negative applied voltages.

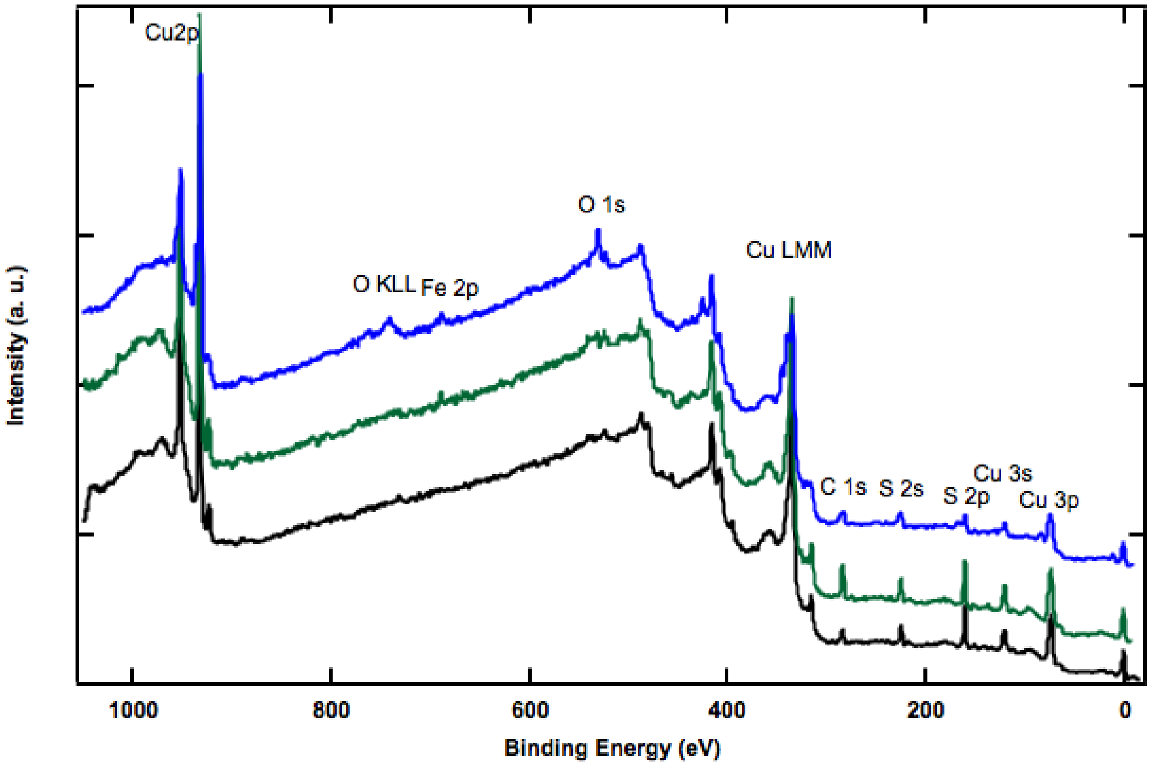

Figure S4. XPS survey scan.

References

1) D. J. Chakrabarti and D. E. Laughlin, *Bul. Alloy Phase Diagrams*, 1983, **4**, 254.