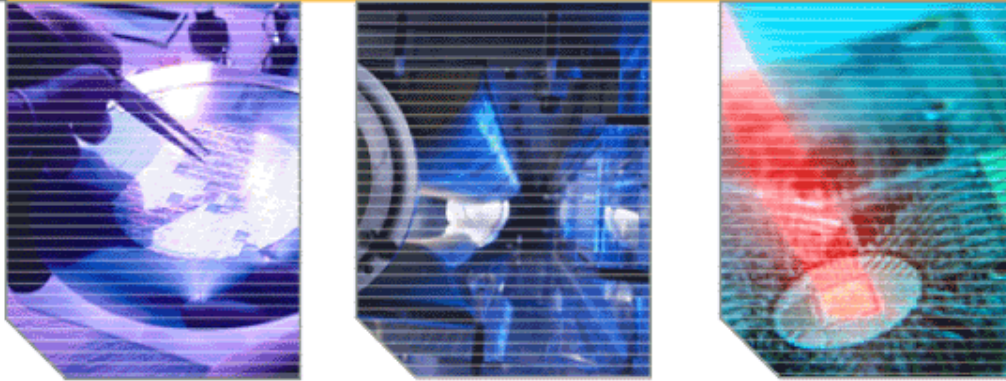


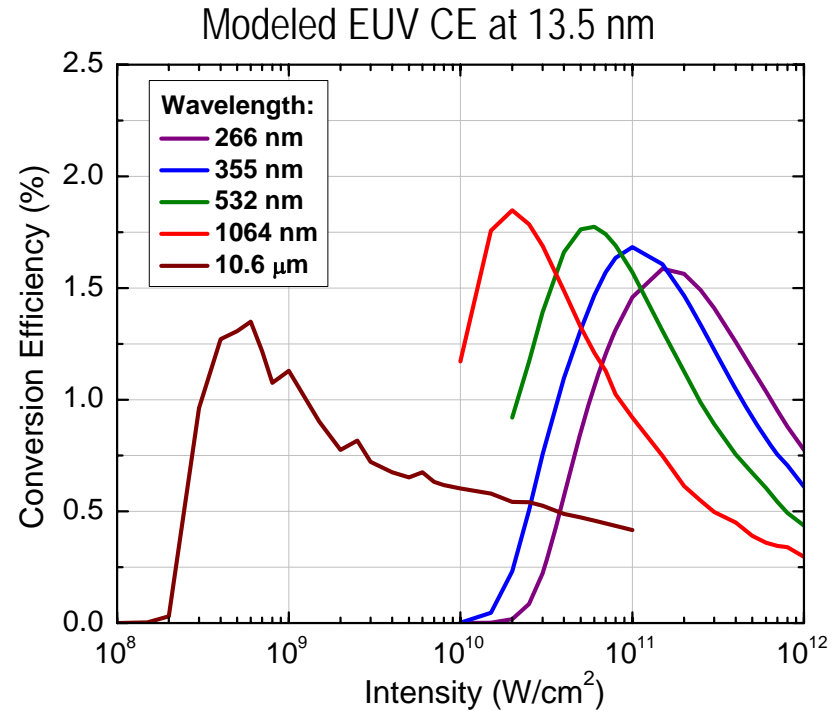
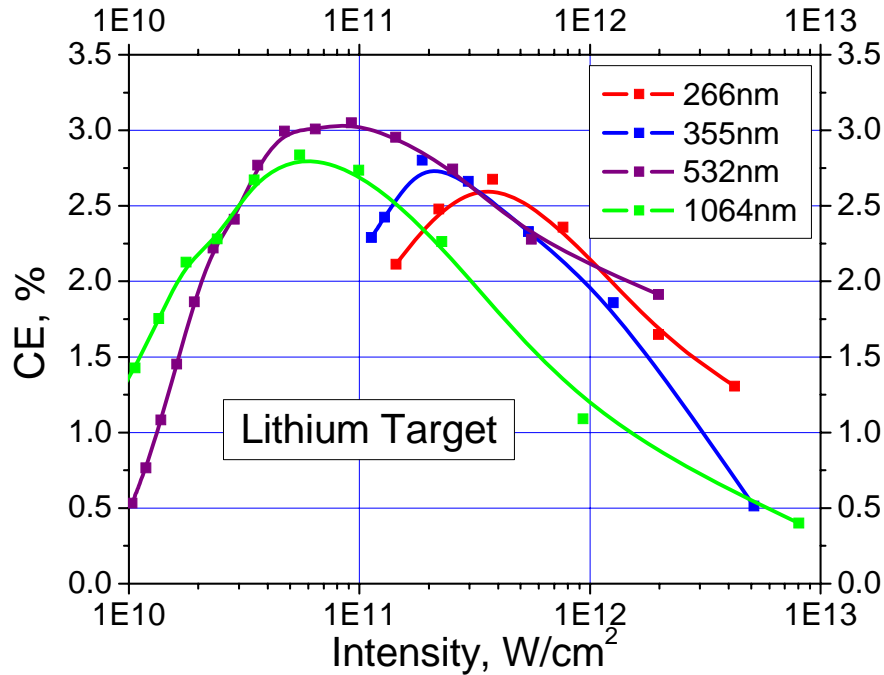
Feasibility of Lithium as a Source Fuel



Alex Ershov

November 10, 2005

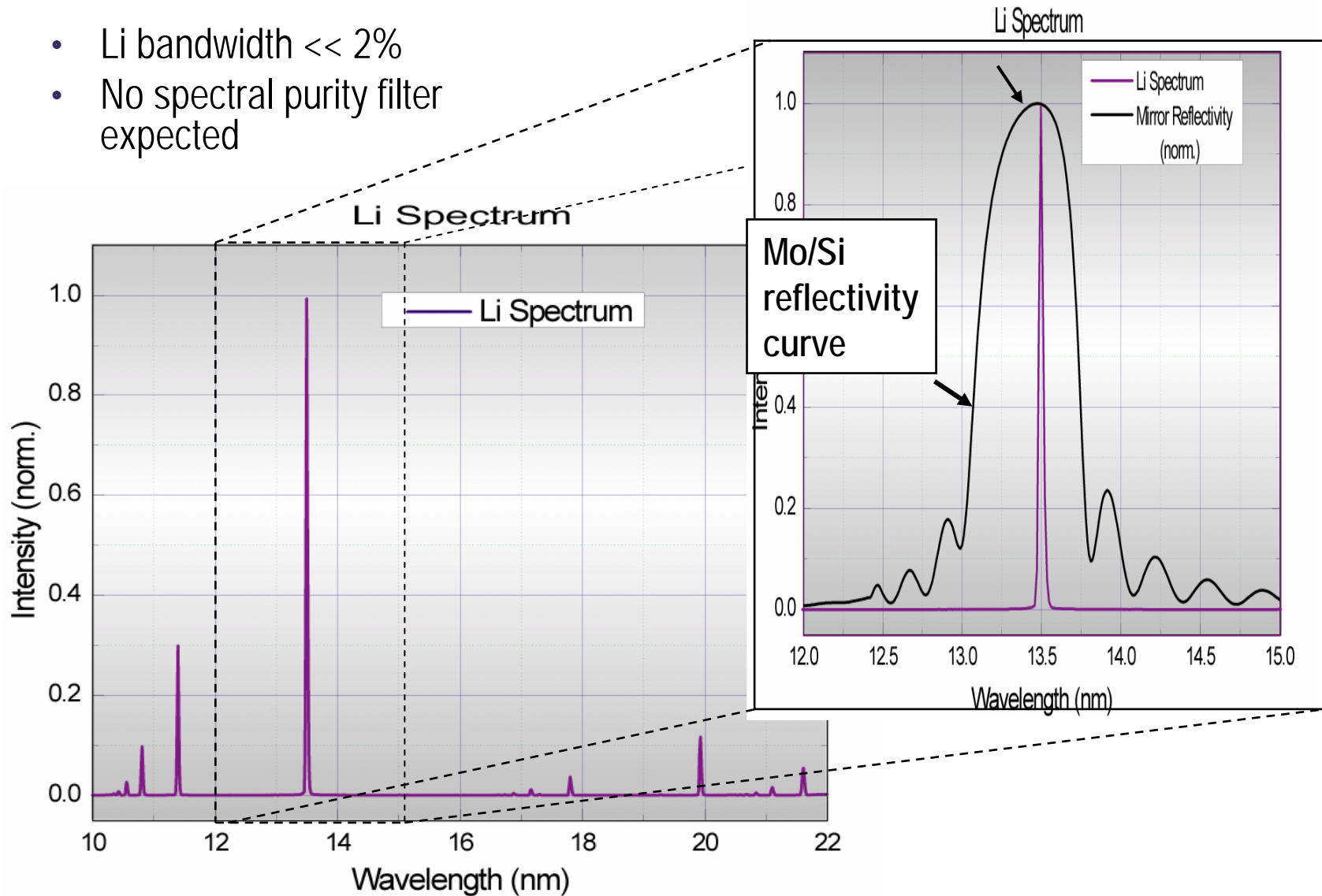
Lithium has High Conversion Efficiency at 13.5nm



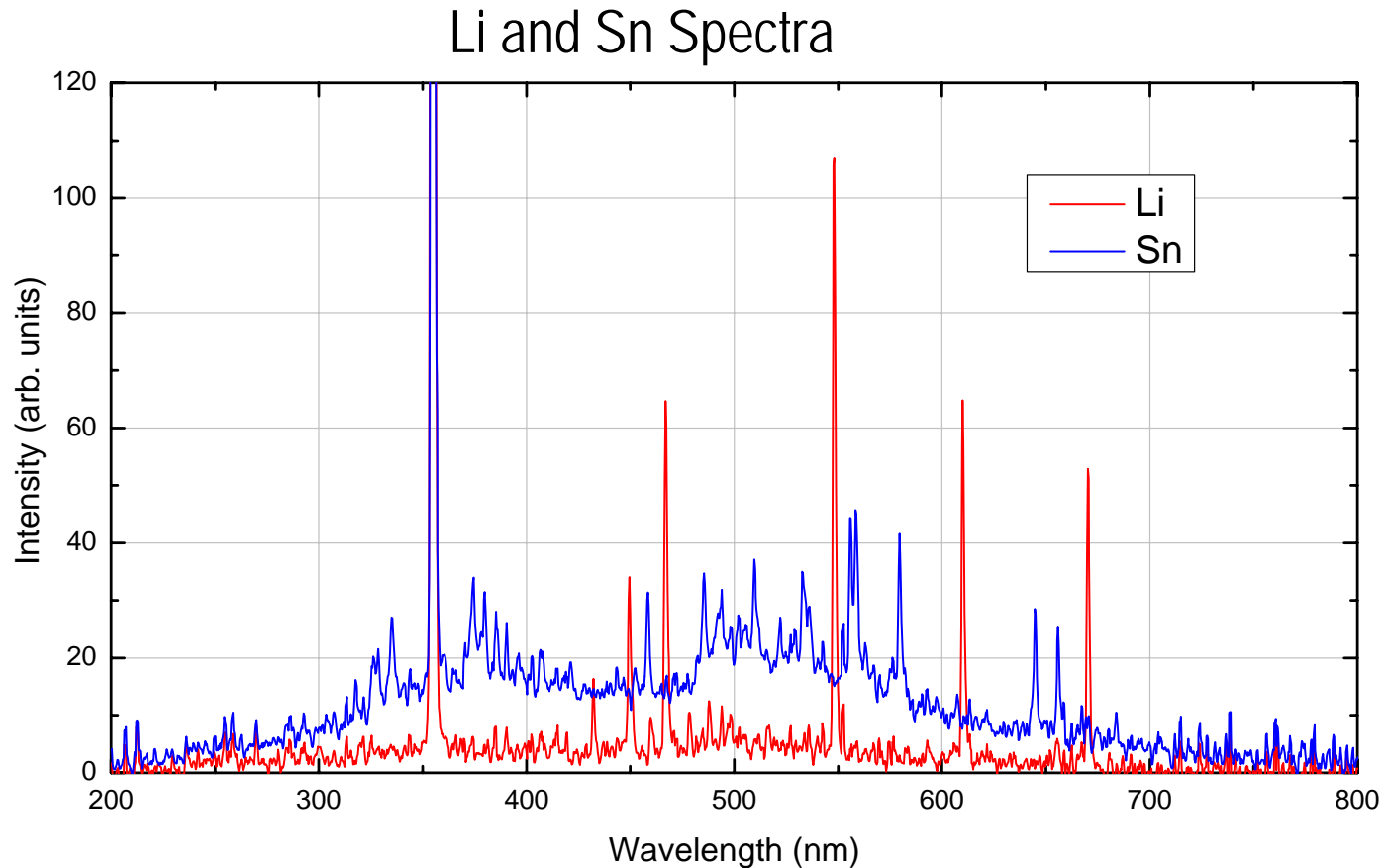
- Li CE > 2.5% with 355nm (non-optimized)
- Li offers broad choice of drive-laser wavelengths

Li Produces Narrow In-Band Spectral Emission

- Li bandwidth $\ll 2\%$
- No spectral purity filter expected



Li has Low Ultraviolet-Visible Out-of-Band Radiation



Out-of-band spectra for LPP with lithium and with tin, 355 nm laser excitation

High Temperature Operation Drives Lithium off of Collector Surface by Evaporation

1) Mo sample before deposition



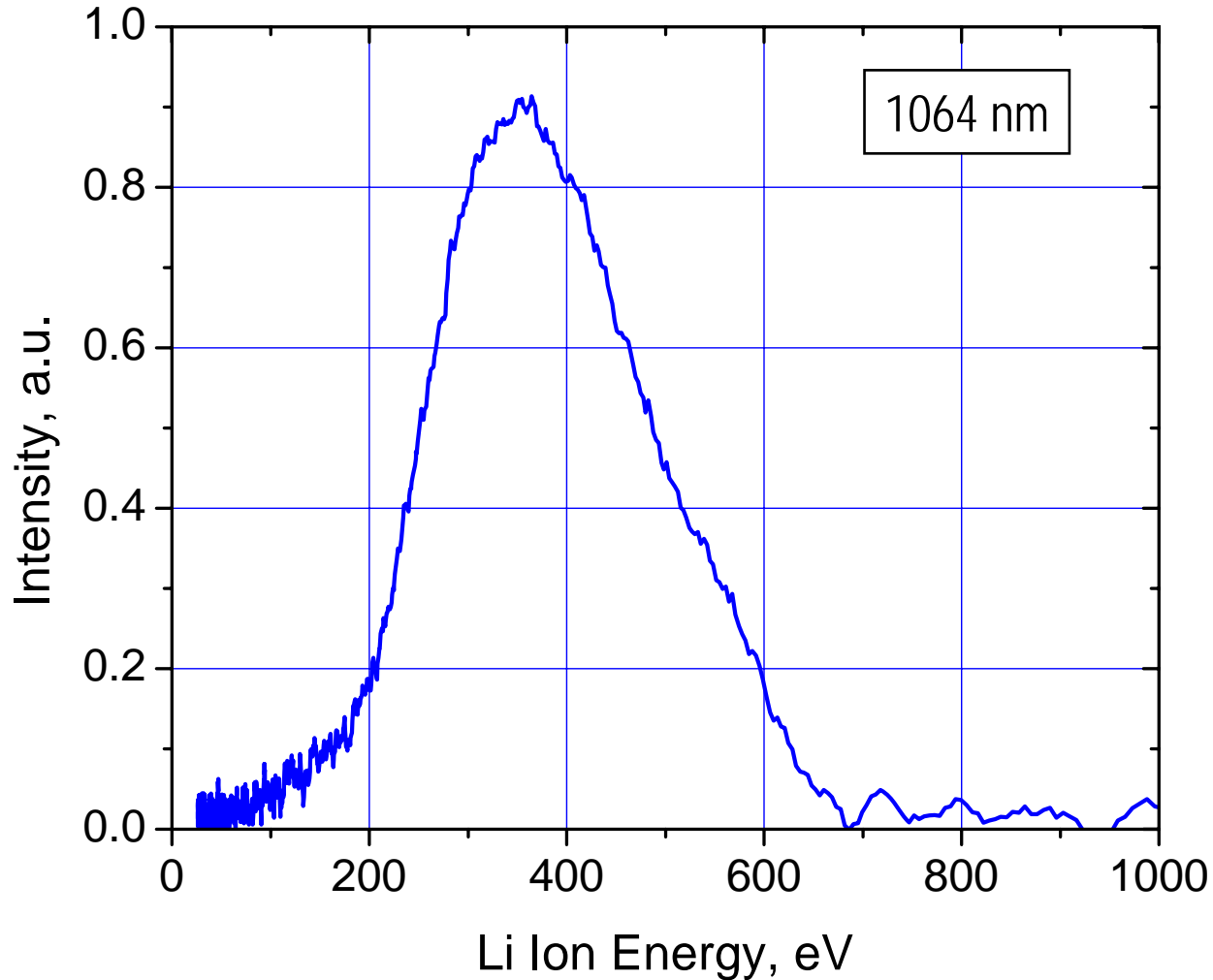
2) Mo sample after deposition



3) Mo sample after evaporation



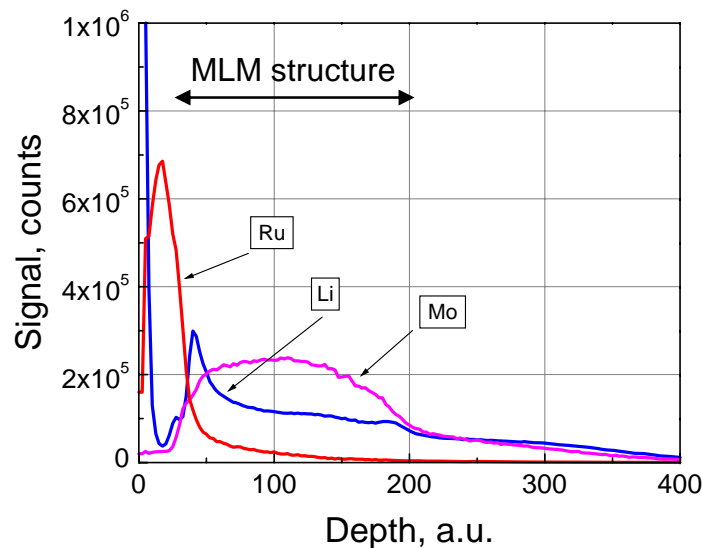
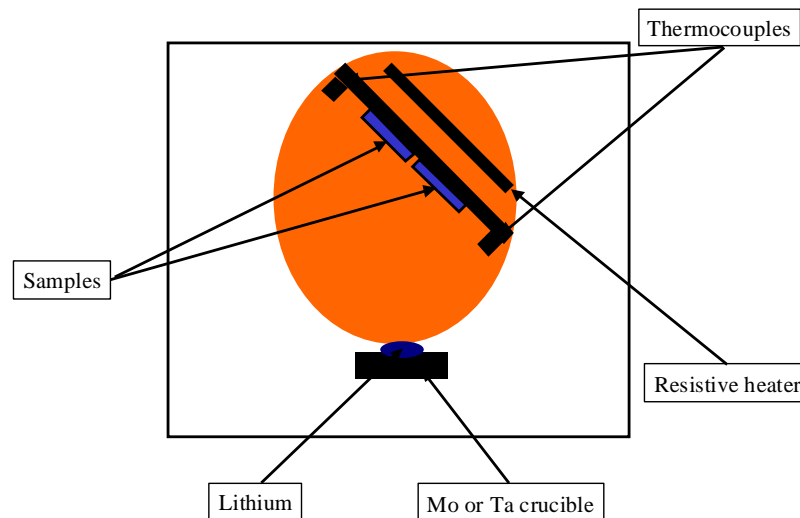
Lithium has Low Ion Energy



- TRIM modeling shows 12X advantage over Sn

Li Barrier Diffusion is Needed

- Barrier diffusion testing includes a Li effusion cell
 - The samples were heated to 400C and exposed to lithium vapors.
 - After exposure, samples were kept hot for 12 hours, then later analyzed utilizing SIMS microscope.
- Results for Ru-capped MoSi₂/Si mirror (on the right) show that lithium diffuses through the MLM structure, and destroys the periodic structure.



Diffusion Barrier Materials

- At least three promising Li diffusion barrier materials have been demonstrated in the MLM, however each has limitations
 - Thermal stability
 - Maximum reflectivity
- Formation of Li compounds on collector surface
- Further research is necessary to enable Li as source fuel

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