



# Thermal response of Lithium foils placed in a DiMES sample

ALPS e-conference

*May 04, 2001*

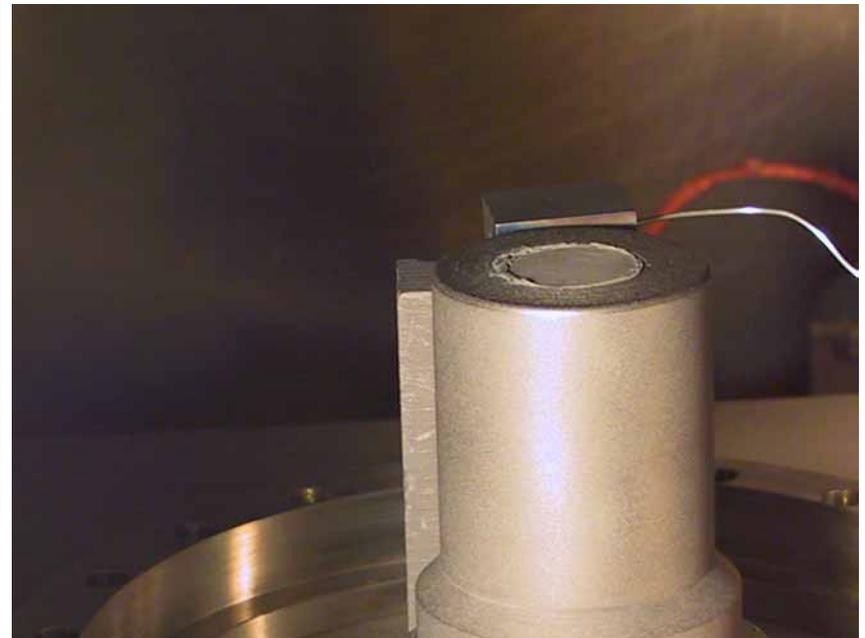
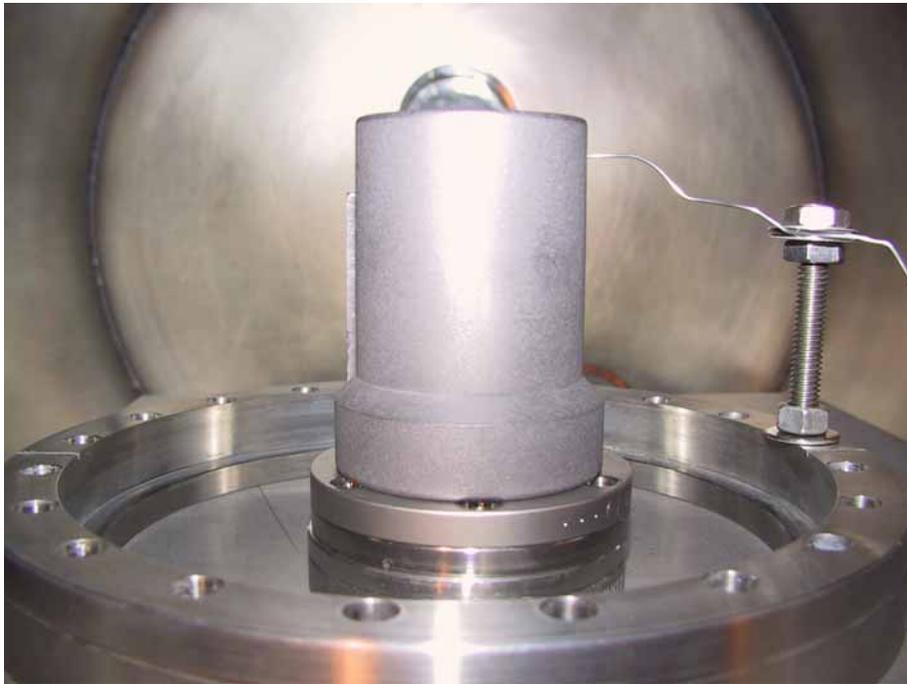
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A nearly identical Li foil DiMES sample was prepared for thermal response testing in the EBTS

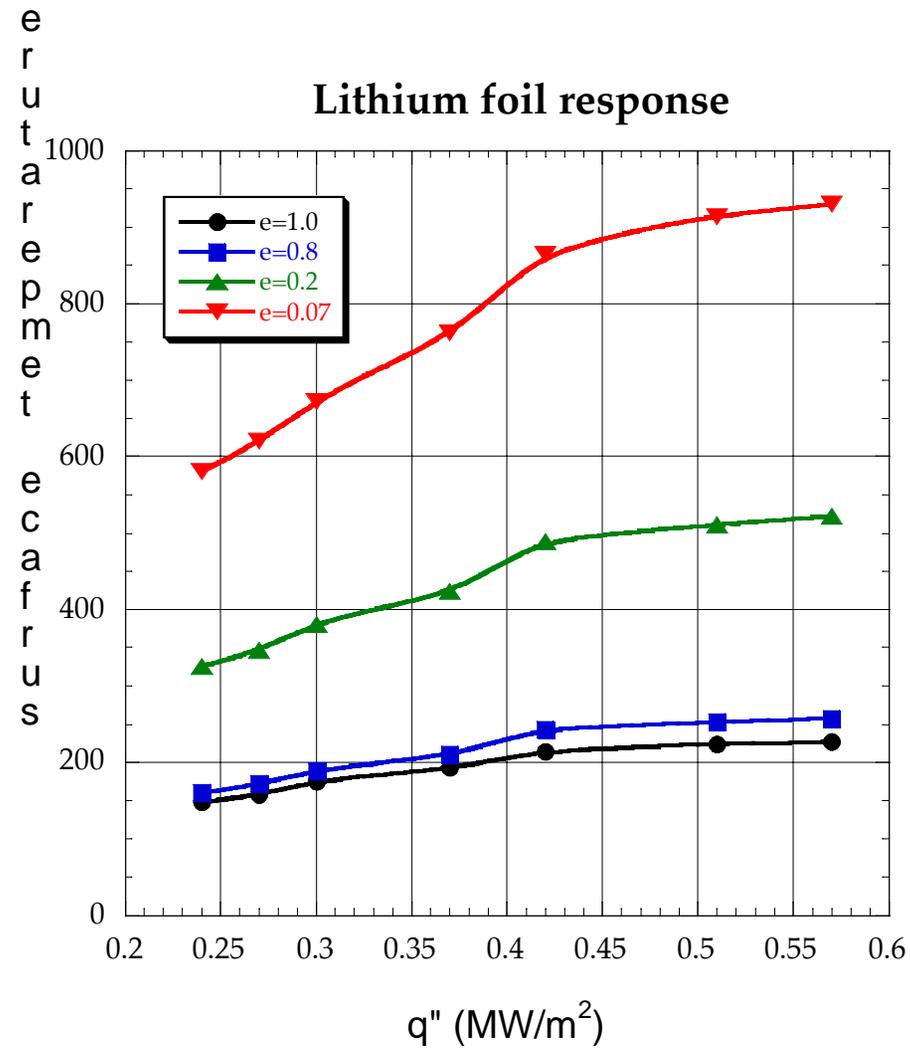
The sample consisted of 5 layers of 0.25-mm-thick Li foils 25.4 mm in diameter. Poor thermal contact between foils and the ATJ graphite sample holder.



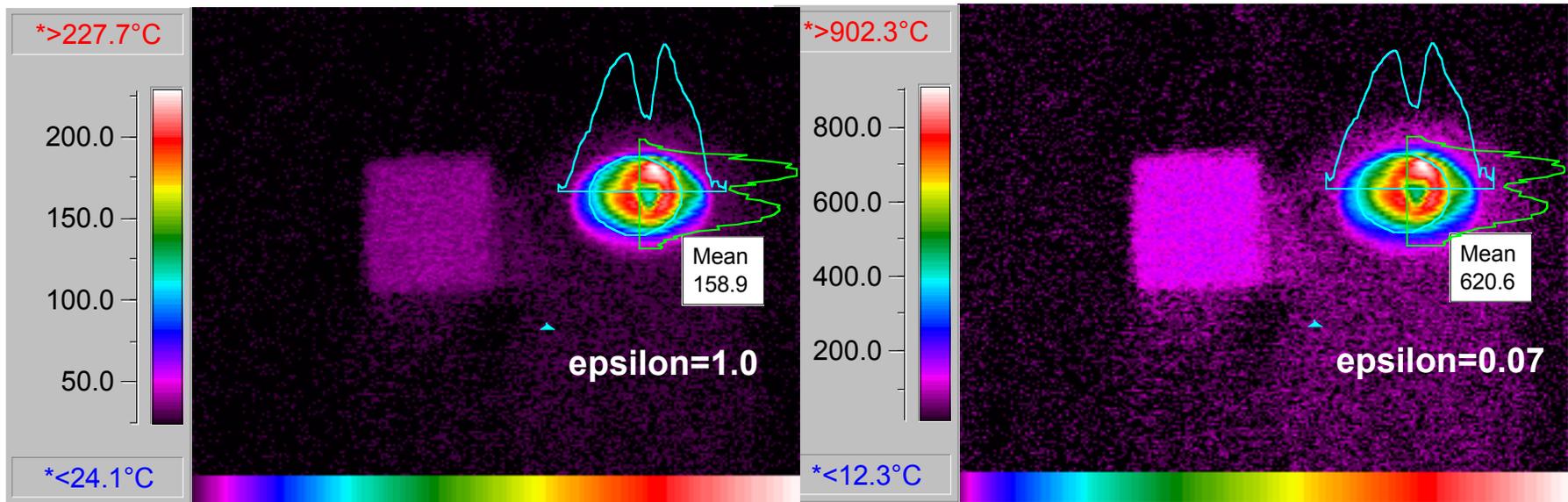
As-arrived condition of foils showing oxide. The 5 layers were pressed into a 1.3-mm-deep well.



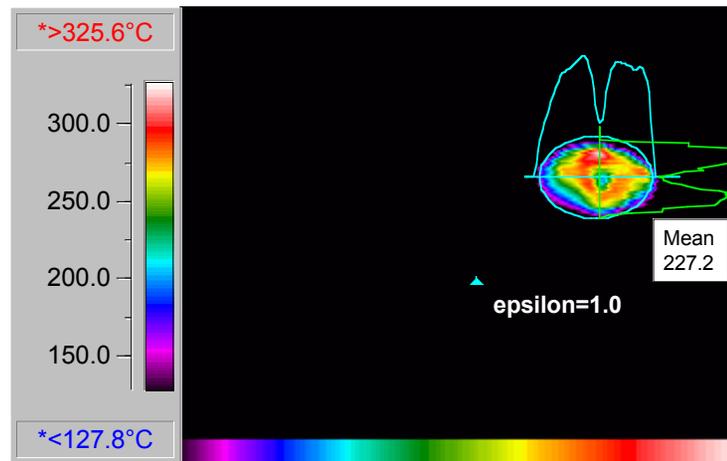
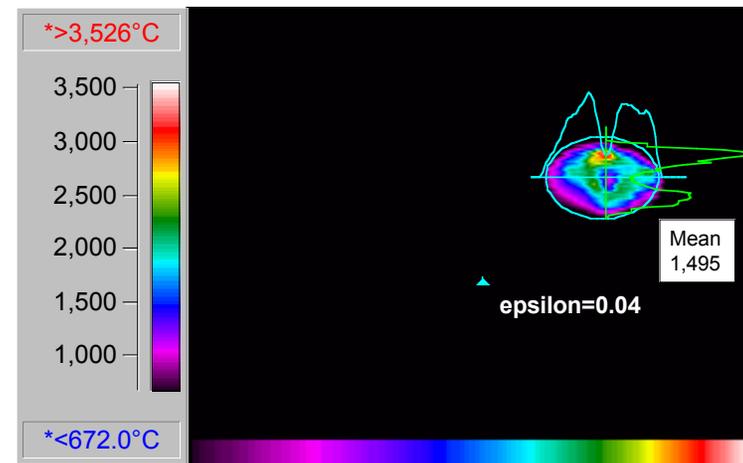
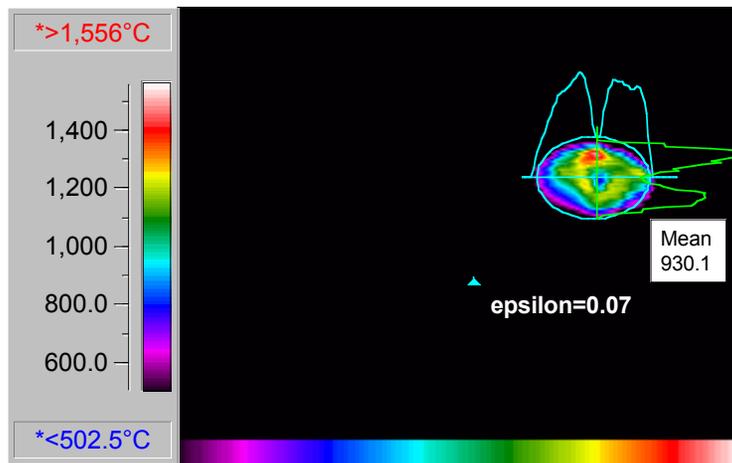
EBTS results: Surface temperature very dependent on emissivity.  
Emissivity between 0.07 and 0.2.  
Immediate melting at 0.24 MW/m<sup>2</sup>. Vaporization at 0.42 MW/m<sup>2</sup>.



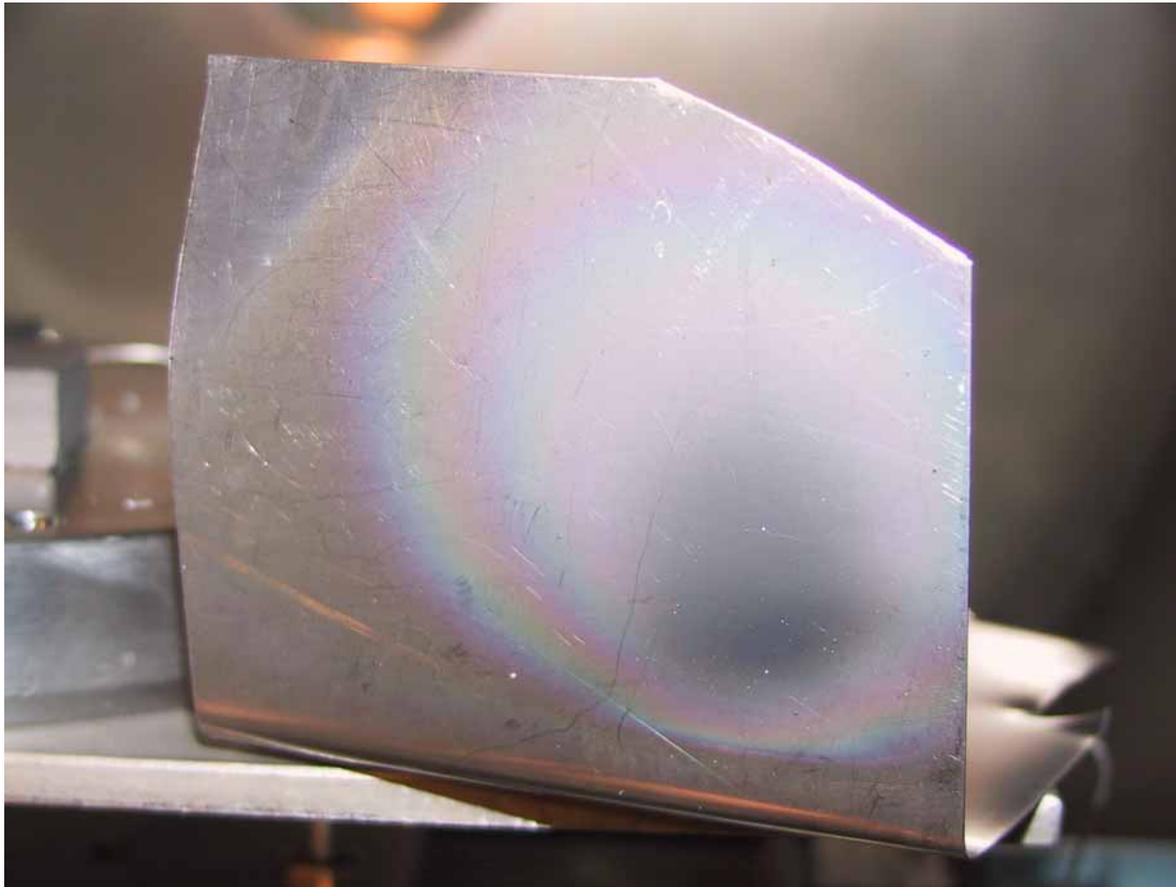
# Li foils: 0.27 MW/m<sup>2</sup>



# Li foils: 0.57 MW/m<sup>2</sup>



Li vapor produced above  $0.4 \text{ MW/m}^2$ . Vapor pressure trips e-beam above  $0.55 \text{ MW/m}^2$ . Plume deposited on stainless steel sheet.



Lithium foils melted layer by layer. Solidification also showed evidence of layering. Did not wet the graphite.



Post-test photo



## Conclusions

- Poor thermal contact between foils and sample holder
- Melting even at the lowest heat flux -  $0.24 \text{ MW/m}^2$
- Impurities raise emissivity between 0.07 and 0.2
- At  $0.35 \text{ MW/m}^2$ , surface temperatures are 410-750 °C
- Lithium surface temperatures are 500-900 °C above  $0.4 \text{ MW/m}^2$
- Substantial vaporization above  $0.4 \text{ MW/m}^2$