



**MATERIALS SCIENCE  
& ENGINEERING**  
TEXAS A&M UNIVERSITY

# Introduction to Materials Science & Engineering

## Thermal Expansion

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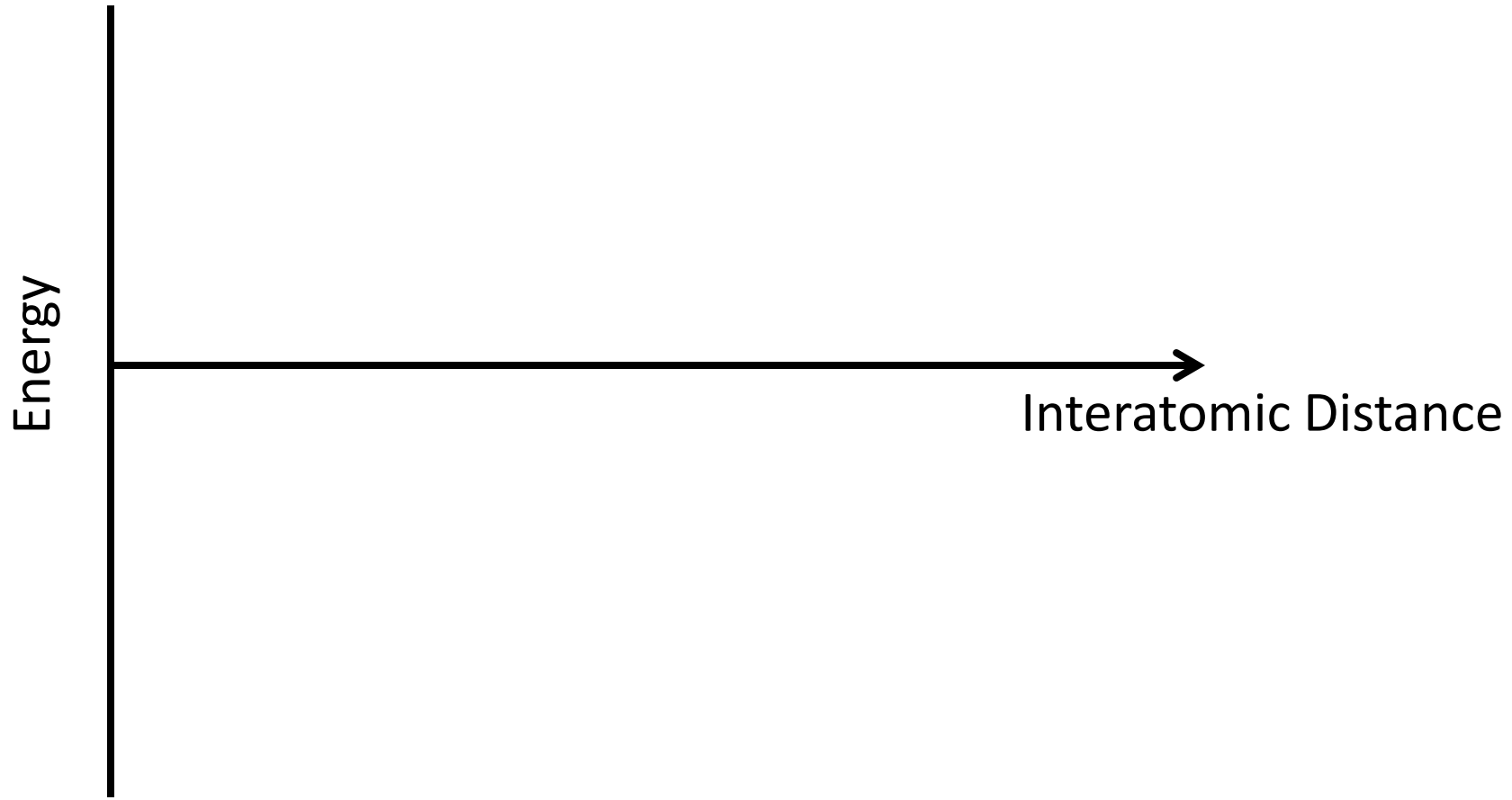


# Thermal Expansion

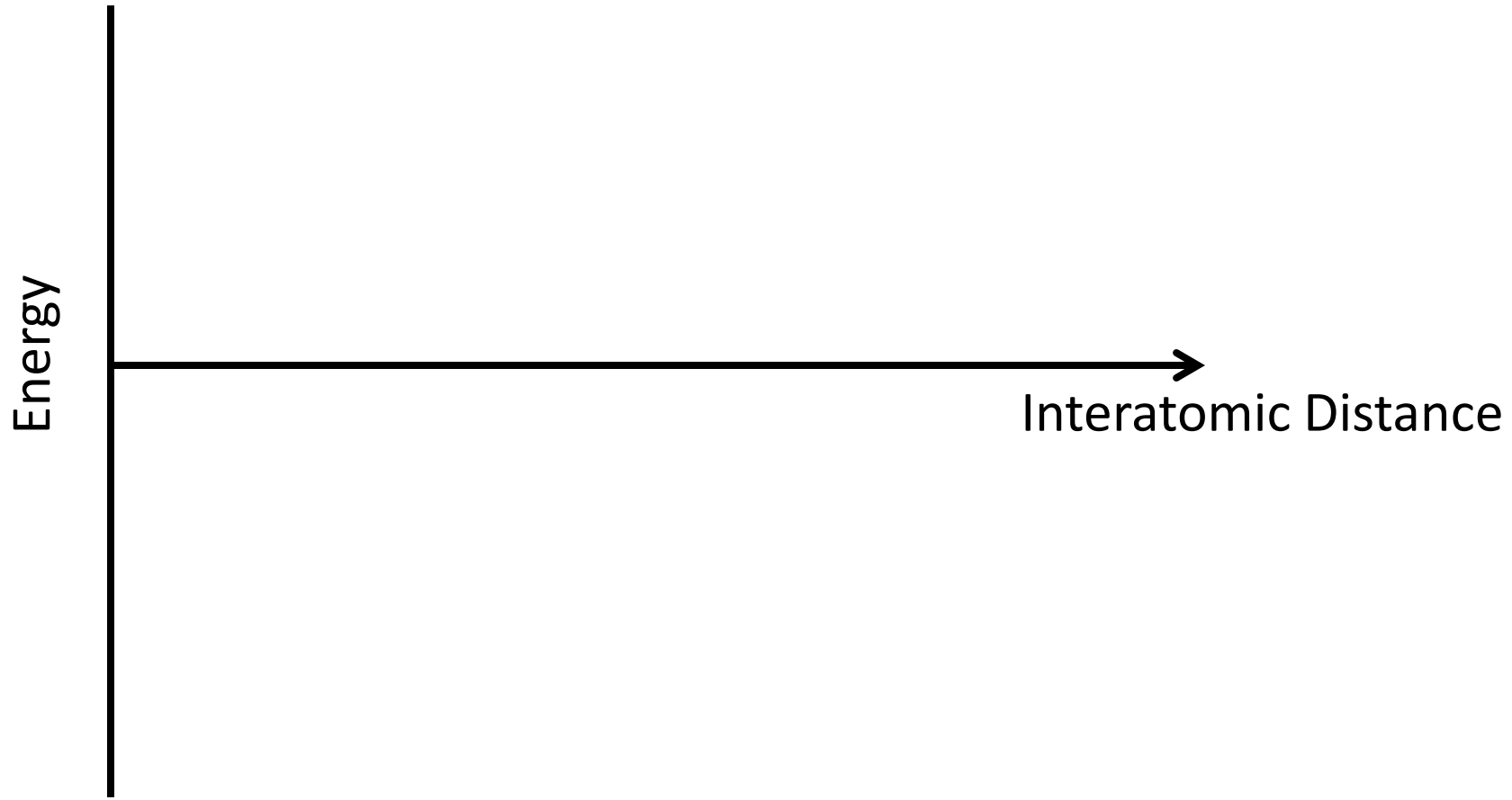
$$\alpha_L = \frac{1}{L} \frac{dL}{dT}$$

$$\alpha_V = \frac{1}{V} \left( \frac{\partial V}{\partial T} \right)_p$$

# Thermal Expansion



# Thermal Expansion



# Summary

- Thermal expansion leads to strain
- Thermal expansion derives from interatomic bonding curves
- Thermal expansion coefficient is greater for “weaker” bonds