Thermoelectric module interface engineering using Li-NiO/Al-ZnO composites

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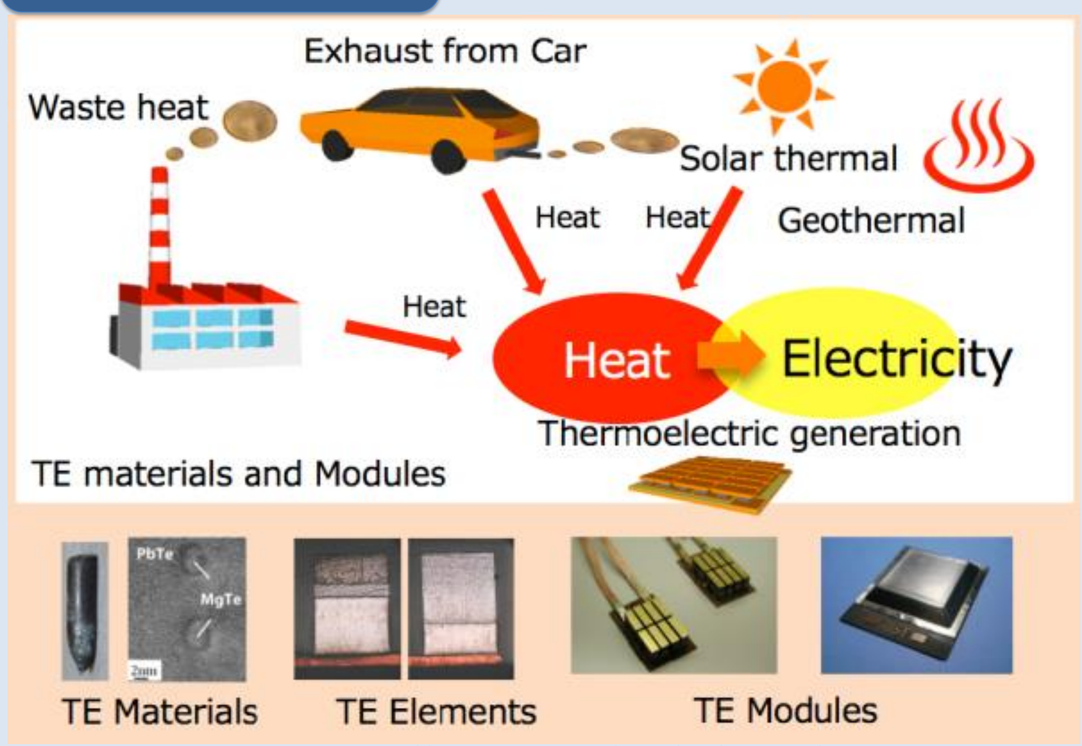
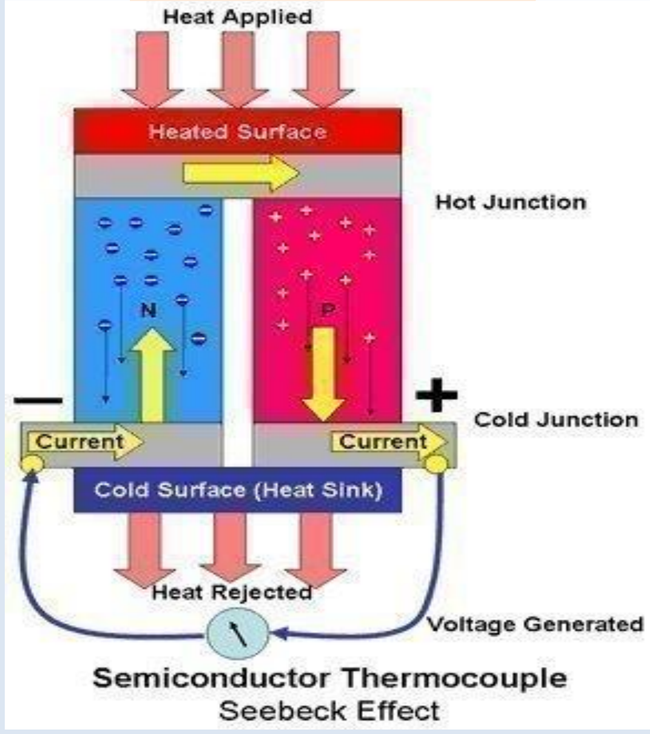
1. Introduction



https://unit.aist.go.jp/ieco/en/groups/index.html

Seebeck effect



http://www.tech-faq.com/seebeck-effect.html

Device/Module *ZT*

$$Z_{Device}T = \frac{S^2_{Device}}{k_{Device}\,R_{Device}}T$$

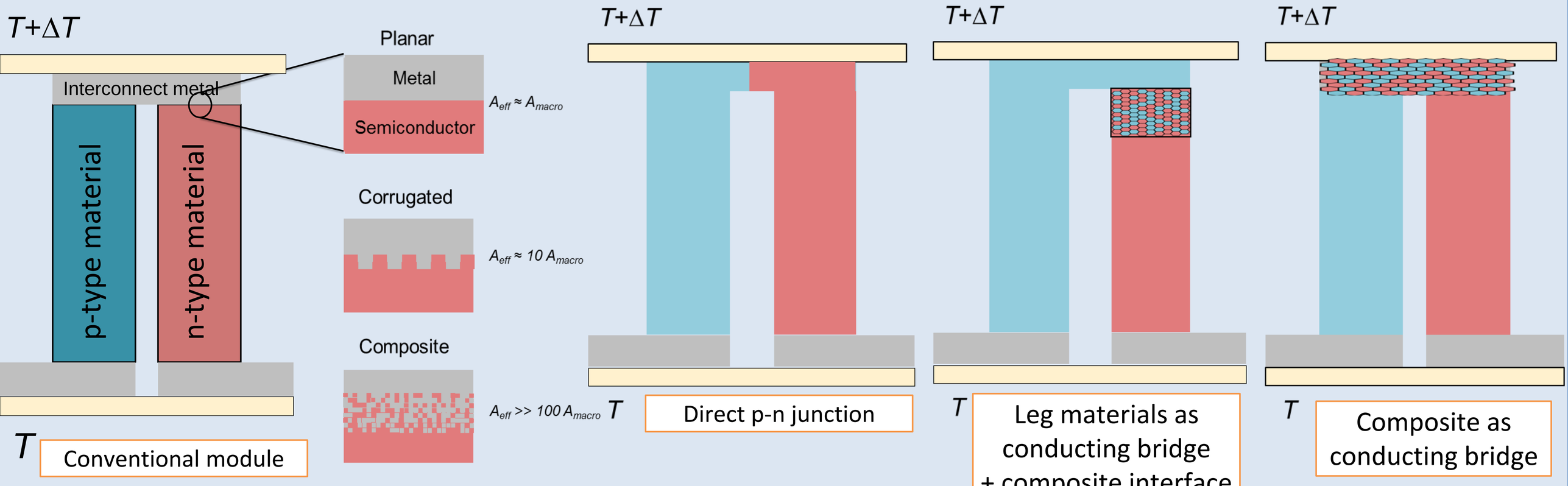
$$S_{Device} = S_p - S_n$$

$$k_{Device} = \frac{A_n}{L}k_n + \frac{A_p}{L}k_p + \frac{A}{k_{contact}}$$

$$R_{Device} = R_{legs} + R_{contact} + R_{interconnect}$$

How to minimize the contact resistance .....

2. Thermoelectric module interface engineering

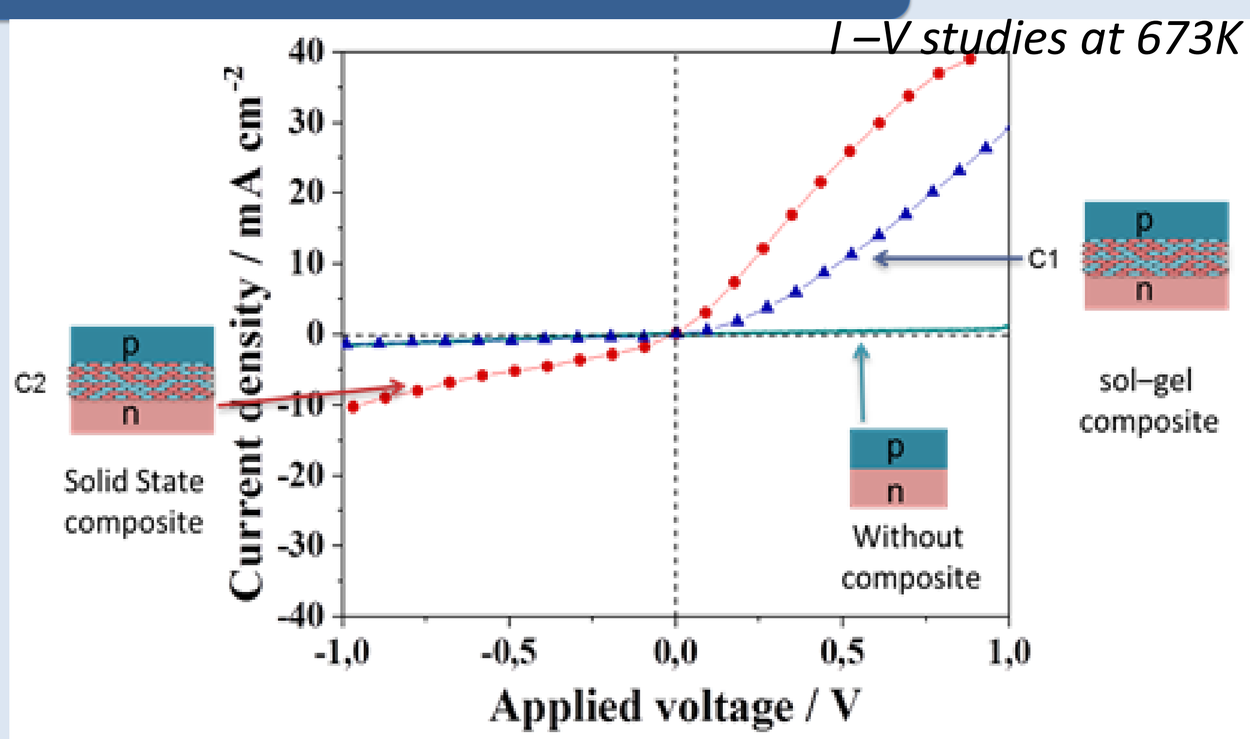


Same projected area – Higher effective area - Reduces the resistances

3. Li-NiO/Al-ZnO Composite interfaces: What affects resistance and rectification?

1. Self assembled Li-NiO/Al-ZnO Composite → sol–gel combustion

2. Mechanically mixed Li-NiO/Al-ZnO Composite → Solid State reaction



4. Conclusions and questions

- **Sol-gel p-n interface composites**
  - *More rectifying! Fine microstructures, Sharp (co-existent, equilibrated) interfaces?*
- **Solid State p-n interface composites**
  - *Less rectifying (more ohmic)! Coarse microstructures, Less perfect (diffused) interfaces?*