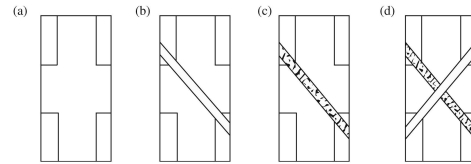


Spring 2008 MSAE E4990y
Introduction to STM and AFM

Lecture 6 and 7
Bardeen Tunneling Theory
February 11 and 13, 2008

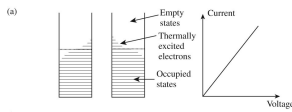
The Metal-Insulator-Metal Tunneling Junction



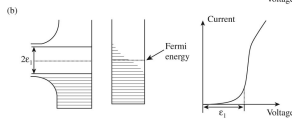
- (a) A glass slide with four indium contacts.
- (b) An aluminum strip is vacuum deposited.
- (c) The Al strip is heated in air to form an oxide film.
- (d) A lead strip is deposited across the Al strip.

Tunneling Spectra in classical tunneling junctions

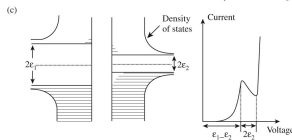
Normal metal – normal metal



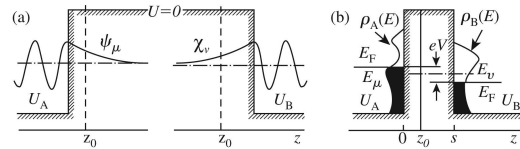
Normal metal – superconductor



Superconductor – superconductor.

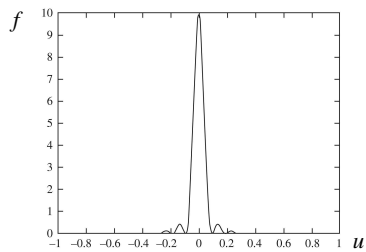


Bardeen Tunneling Theory



- (a) The separate electrodes.
- (b) The tunneling junction.

The condition of elastic tunneling



A chart of the function $f = \frac{\sin^2 au}{\pi au^2}$ for $a=31.4$