In accordance with one embodiment of the present invention, a Gap Diode is disclosed in which a tubular actuating element serves as both a housing for a pair of electrodes (92) and as a means for controlling the separation between the electrode pair. In a preferred embodiment, the tubular actuating element (90) is a quartz piezo-electric tube. In accordance with another embodiment of the present invention, a Gap Diode is disclosed which is fabricated by micromachining techniques in which the separation of the electrodes (202, 206) is controlled by piezoelectric, electrostrictive or magnetostriective actuators. Preferred embodiments of Gap Diodes include Cool Chips, Power Chips, and photoelectric converters.