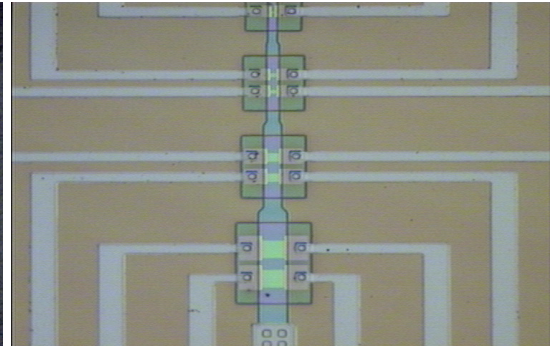
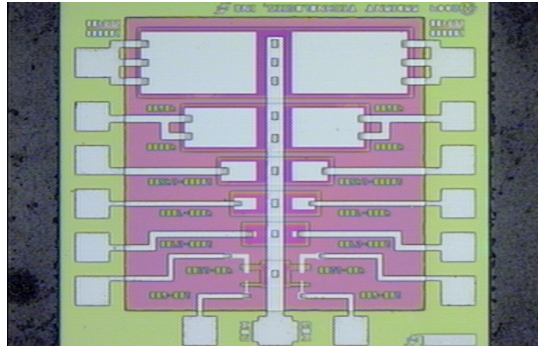
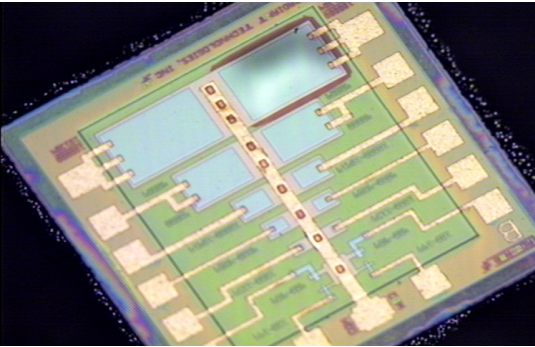


Cleanroom Services



3 μ m-thick PZT membrane capacitor that can move 2 microns vertically during 2 volt

Radiant Technologies operates a small but capable cleanroom where it fabricates thin PZT film devices. The facility is available to Radiant's customers for custom processing ranging from individual process steps like depositing a thin metal layer up to fabrication, dicing, and packaging of fully integrated PZT capacitors, MEMS, or ferroelectric-gate transistors.

Following is a list of individual process steps available to customers on a custom basis:

1. Wet oxidation of silicon wafers.
2. Deposition of high temperature titanium dioxide on silicon and quartz wafers.
3. Deposition of global or patterned platinum bottom electrodes on silicon and quartz wafers.
4. Deposition of the following thin PZT compositions from 600 Ångstrom thickness up to 2.7 μ m thickness depending upon composition:
 - a. 20/80 PZT
 - b. 1/20/80 through 8/20/80 niobium-doped PZT (PNZT)
 - c. 1/20/80 through 8/20/80 lanthanum-doped PZT (PLZT)
 - d. 40/60 PZT
 - e. 52/48 PZT
 - f. 8.5/65/35 PLZT
 - g. 90/10 or 95/5 PZT

NOTE: PZT compositions at 52/48 or with higher ratios of zirconium require the use of a seed layer of 15/0/100 PLZT.
5. Deposition of the following metal layers via e-beam deposition either globally or patterned by lift-off:
 - a. Gold
 - b. Chromium/Gold
 - c. Copper
 - d. Chromium/Copper/Flash Gold
 - e. Platinum
 - f. Nickel
 - g. Aluminum
6. Dicing up to 4" silicon or quartz wafers with a K&S automated saw.
7. Fully integrated capacitor, piezoMEMS, and simple Thin Ferroelectric Gate Transistors.