

**Major Achievements of the  
Texas Instruments  
Central Research  
Labs**

**1955-1975**

1. Low-temperature germanium bolometer (Frank J. Low, 1961). Using this instrument, Frank pioneered the field of infra-red astronomy
2. CRYOFLASK (Low)
3. E-beam fabrication of microwave transistor (John Pankratz)
4. Pioneering work on Surface Acoustic Wave (SAW) devices (Clinton S. Hartmann and Lewis T. Claiborne)
5. Ferromagnetic Resonance Angular Transducer Sensor (FRAT) (Cliff Penn, Forrest G. West, and Turner E. Hasty)
6. 3-D seismic processing (Clay Choate)
7. HgCdTe infrared detector (George Pruett, Sebastian Borello, William Brazeale, and Grady Roberts)
8. PbSnTe work on IR sensors (Richard Chapman, Milo Johnson, and Henry Morris)
9. Basic research on semimetals and narrow gap semiconductors. It involved the study of carrier transport and band structures using piezoresistance (William E. Drobish, Robert T. Bate, and Norman G. Einspruch), galvanomagnetic measurements (Gault Antcliff, Russell Hardin, Bate, and Einspruch), and magnetoplasma wave propagation (William Wissemann and Bate). The paraelectric and ferroelectric properties of narrow gap IV-VI compounds were also studied (Antcliff, Bate, David Carter, Dennis Buss, and Michael Kinch)
10. Development of the first metal-insulator-semiconductor (MIS) HgCdTe devices (1970) (Al F. Tasch Jr., Brazeale, and Chapman). Later, Dennis Buss, Chapman, and Kinch expanded this work, resulting in their receipt of the IEEE Jack Morton Award in 1987 for research on solid-state devices

11. Optoelectronic properties and optimization of materials for infrared sensors: HgCdTe, PtSi<sub>2</sub>, Ge:Hg, etc. (Richard Reynolds, Maurice Brau, Chapman, and Werner Beyen)
12. Tunable lead-salt diode lasers for auto exhaust monitoring (Antciffe, Bate, and Joe Wrobel)
13. Chalcogenide glasses for infrared windows (Ray Hilton)
14. First one-million-pixel charge-coupled device (CCD) imager (Dean Collins)
15. He magnetometer (Don Colegrove, Laird Schearer, and Joe Rice)
16. Study of electron spin resonance (EPR ) in II-VI compounds (Kent Watts & William Holton)
17. Anomalous ultrasonic absorption in hard superconductors (Claiborne and Einspruch)
18. First superconducting Helmholtz pair (Jack Younse and Einspruch)
19. Start up of the TI Japan front-end.(Penn, Thomas E. Hartman, and others)
20. LCD watch display (Andrew Penz, Charles Ristagno.)
21. GaAs bulk and epitaxial crystal growth (George Cronin and Donald Shaw): led to the early development of Gunn and IMPATT diodes (Hasty, David McQuiddy, and Wisseman), and in the late 1960's to the beginning of Microwave technology critically dependent on GaAs
22. Instrument for measuring epitaxial silicon film thickness (EPILOG) (Graydon Larrabee).
23. As part of an overcoating and passivation project to increase the yield of silicon devices, silicon nitride (Si<sub>3</sub>N<sub>4</sub>) was studied by Hartman and Isaac Trachtenberg, but the deposition process required 800 degrees C. Alan Reinberg then developed a ground-breaking plasma process that ran below 400 degrees. His plasma reactor was subsequently widely used in production at TI.
24. LED-pumped solid state laser (Holton)
25. A study of upper-laser-level lifetimes and Penning production cross sections for He-Cd and He-Zn lasers explained their mode of operation (Schearer and Holton)
26. Flat Panel TV display (Warner Scott and Holton)

27. Solved “failure to guide” problem of TI Shrike missiles when attacking NVA radar installations (Kent Carson)
28. Solved “image degradation” problem of TI FLIRS used to track NVA convoys down the Ho Chi Minh Trail (Carson)
29. Seminal studies of stress-induced mobility changes in p-channel MOSFETs. (Derek Colman, Bate, and Jack Mize)
30. Important professional contributions of Technical Staff, including several hundred outstanding peer-reviewed science and engineering publications in national and international journals, US and foreign patents, participation in international scientific and engineering conferences, and service on government advisory committees. These activities were crucial to the establishment of the worldwide reputation of TI as a highly regarded contributor to science as well as engineering
31. During the 1955-1975 period, J. Ross Macdonald and Frank Low were elected to the National Academy of Sciences and Ross to the National Academy of Engineering, while Robert W. Brodersen, Robert E. Fontana Jr., Larry J. Hornbeck, Don W. Shaw, Al F. Tasch Jr., and Robert Stratton were later elected to the NAE as well.