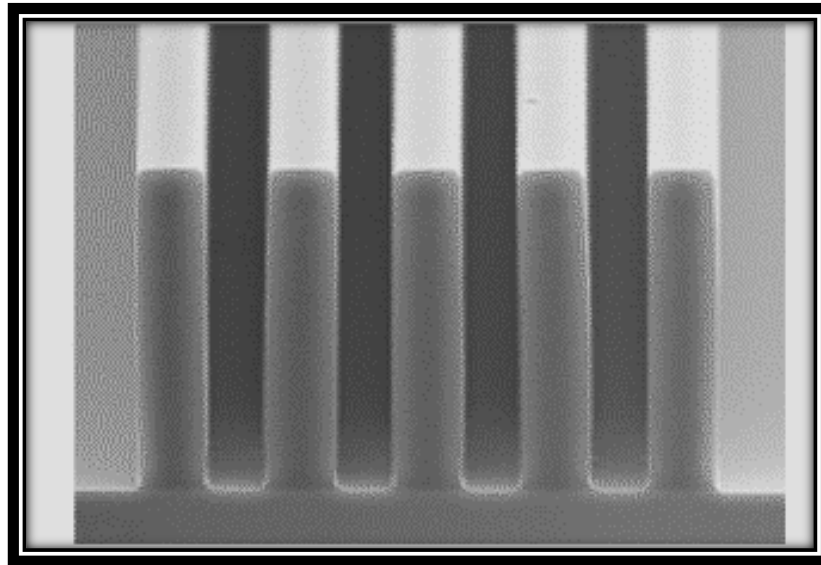


Lecture 10

Chemical Engineering for Micro/Nano Fabrication



Now Resists!



“It” All Started Here



NICÉPHORE
NIÉPCE

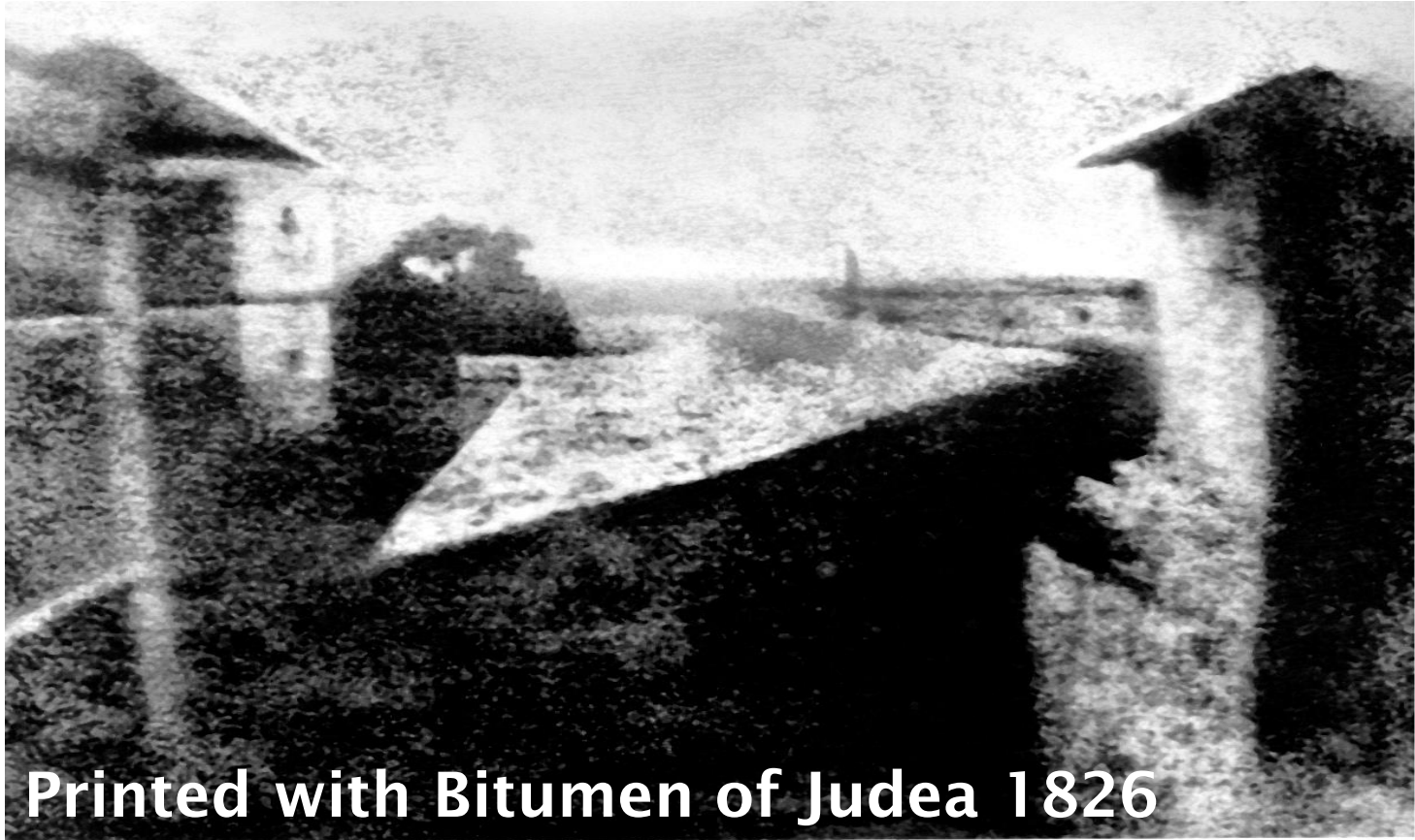
1765-1883



Chalone sur Soane



A Historical Perspective



Printed with Bitumen of Judea 1826

“Point de vue du Gras” by Nicephore Niepce

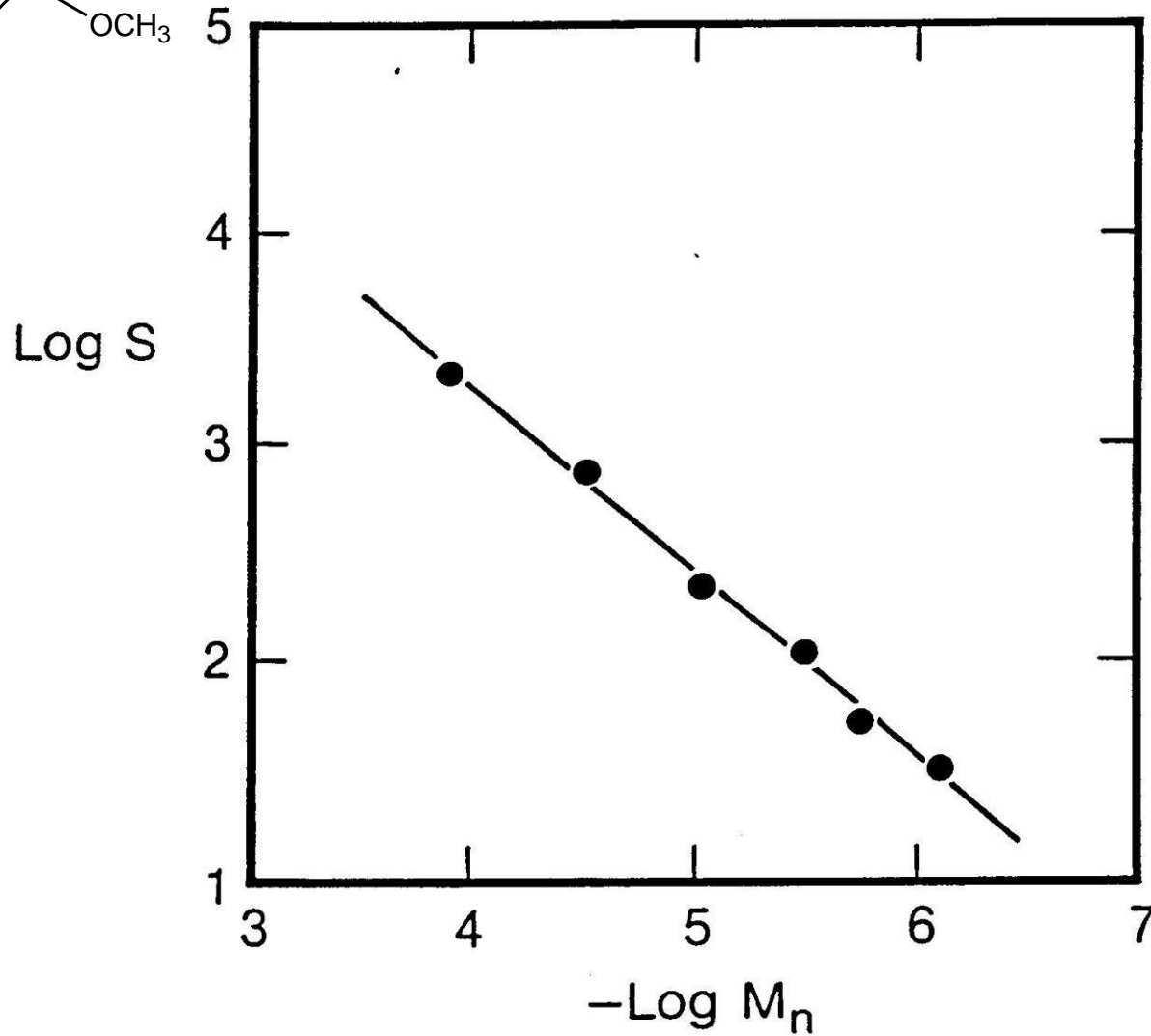
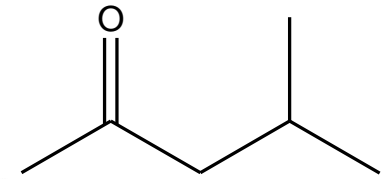
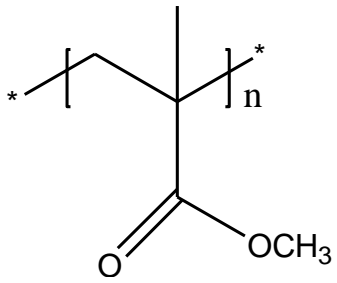


Contact Printing in Bitumen of Judea

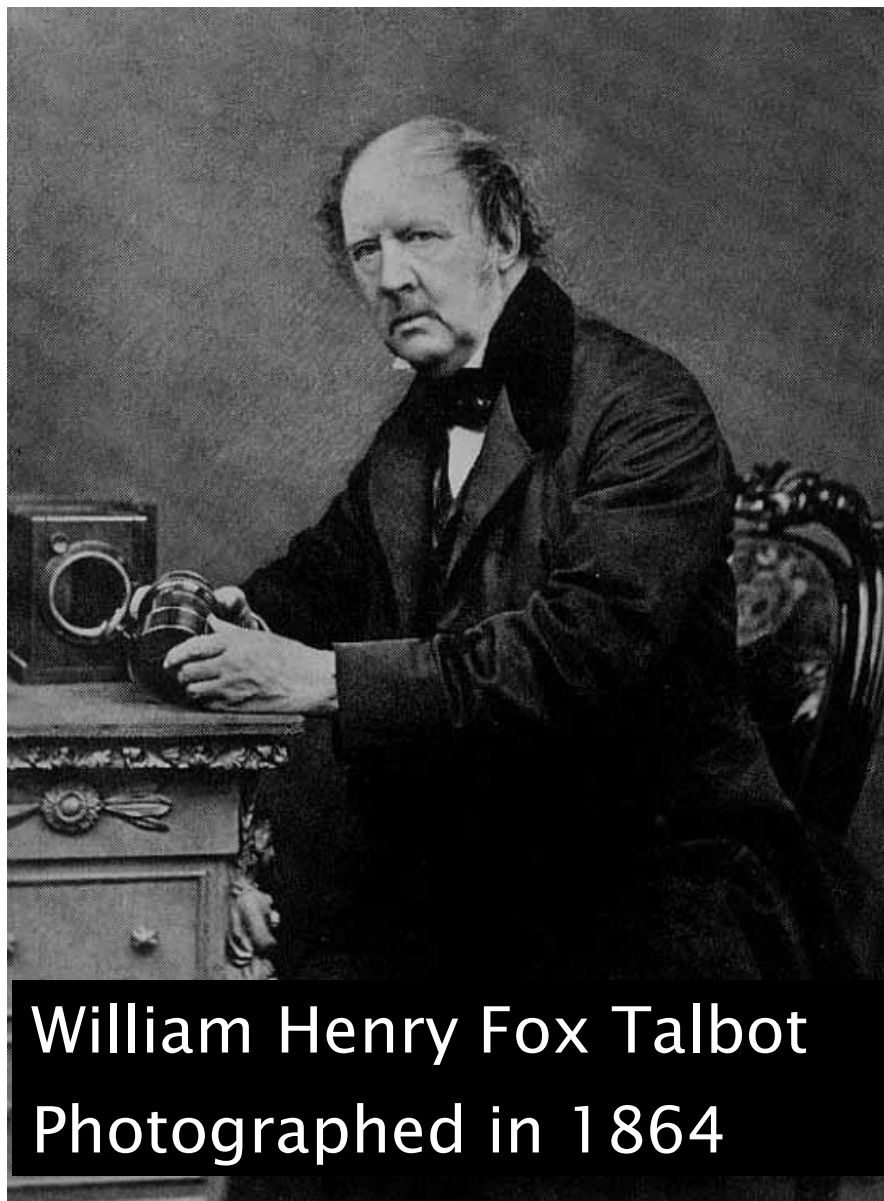
A Contact Photogravure
of Cardinal d' Amboise
by Niepce (1826)



PMMA in MIBK



Dicromated Gelatin



William Henry Fox Talbot
Photographed in 1864

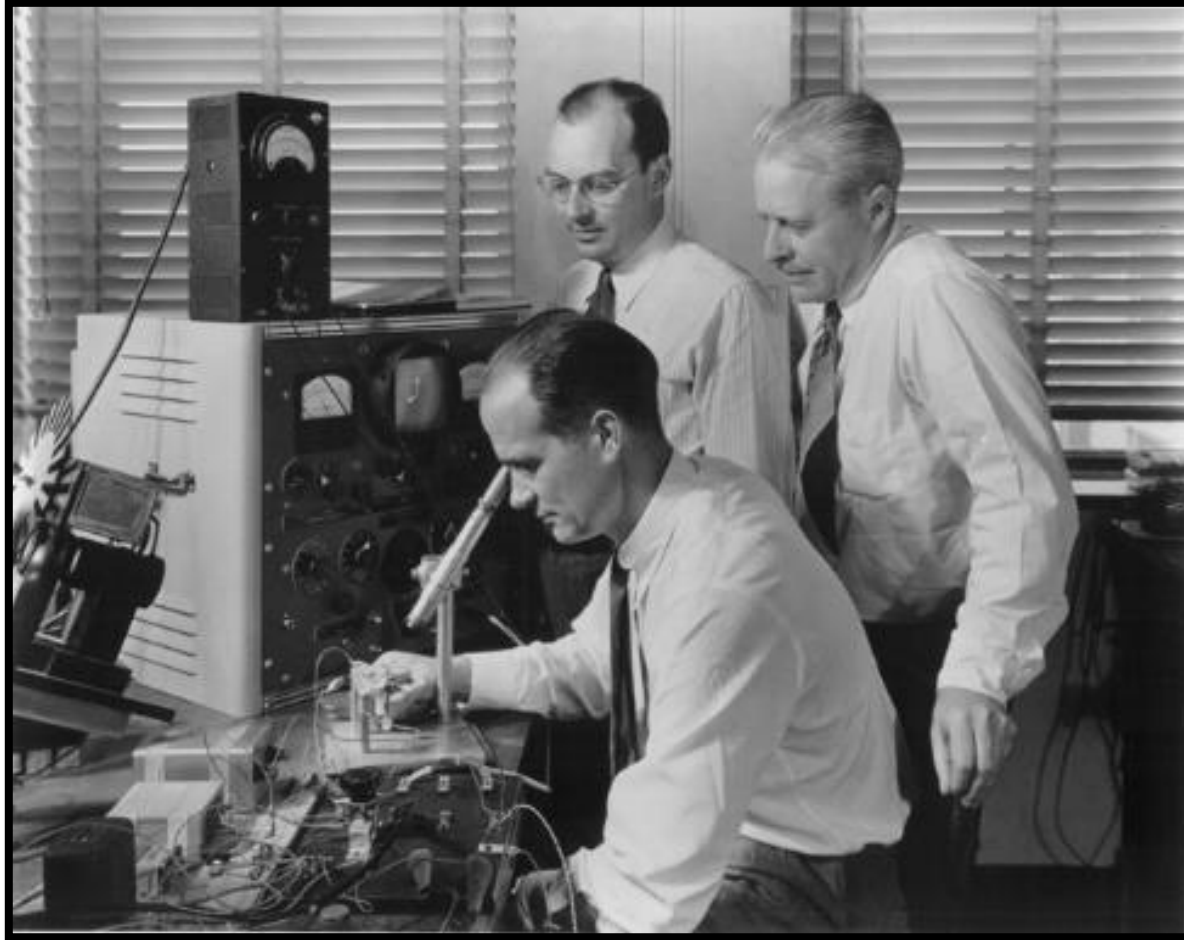
Protein + $K_2Cr_2O_7$

- High Sensitivity
- Poor Shelf Life



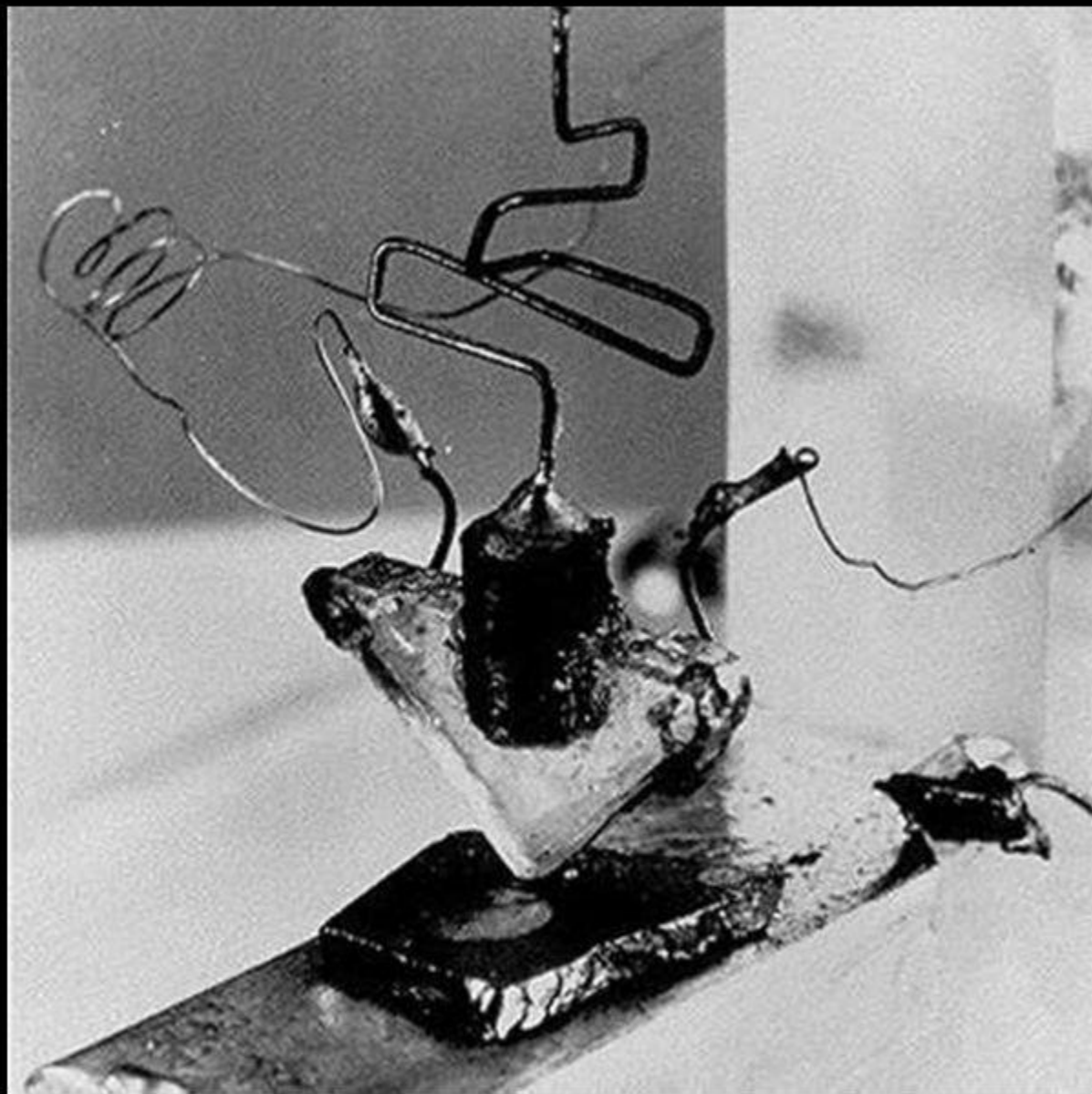
The First Transistor

Bell Laboratories 1947



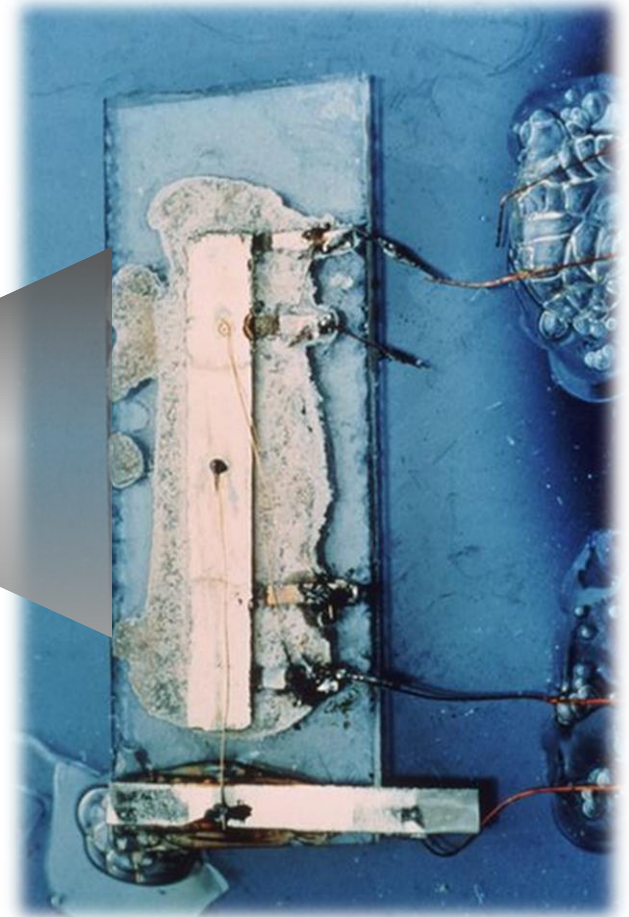
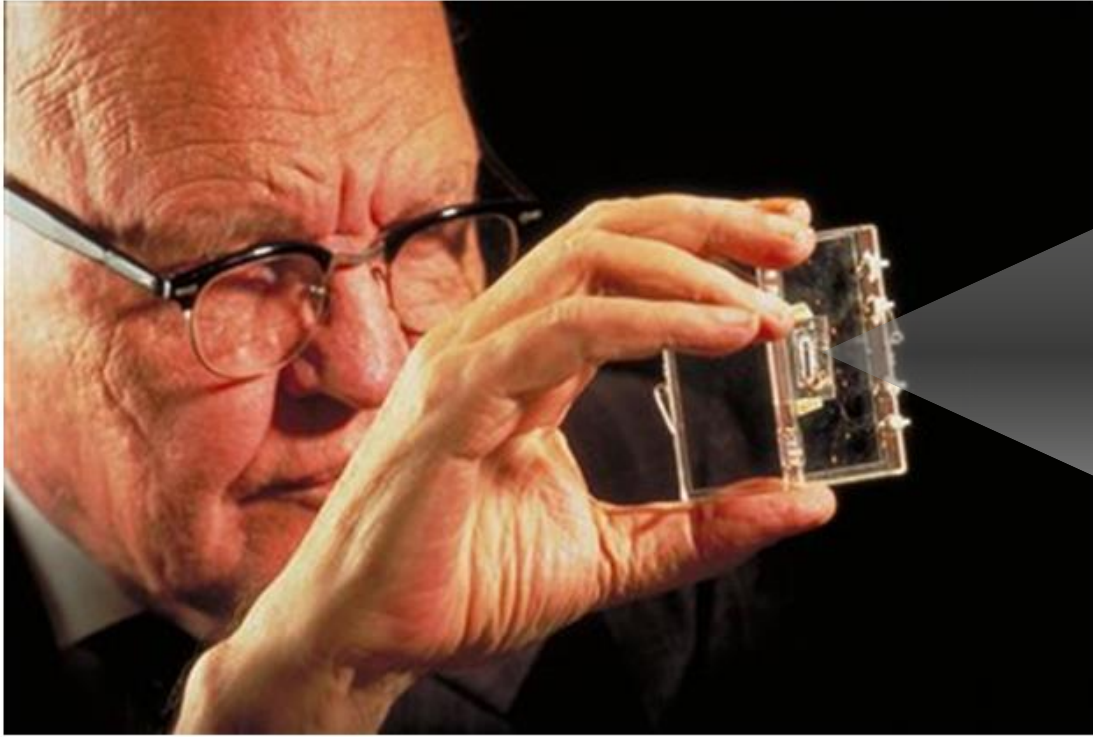
William Shockley, John Bardeen and Walter Brattain





The first solid-state transistor
(Bardeen, Brattain & Shockley, 1947)

First Integrated Circuit

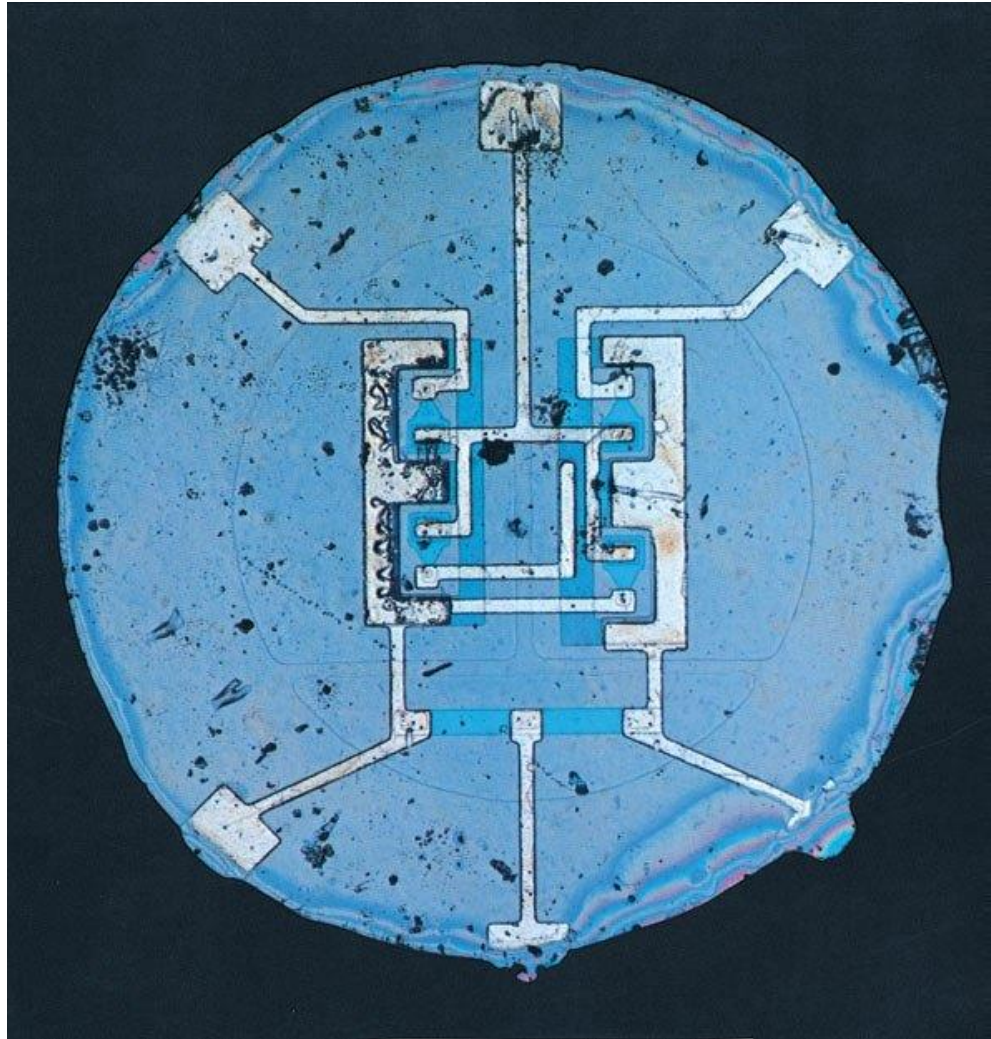


Jack Noyce with the first

Jack Kilby with the first integrated circuit - 1958
Nobel Prize 2000



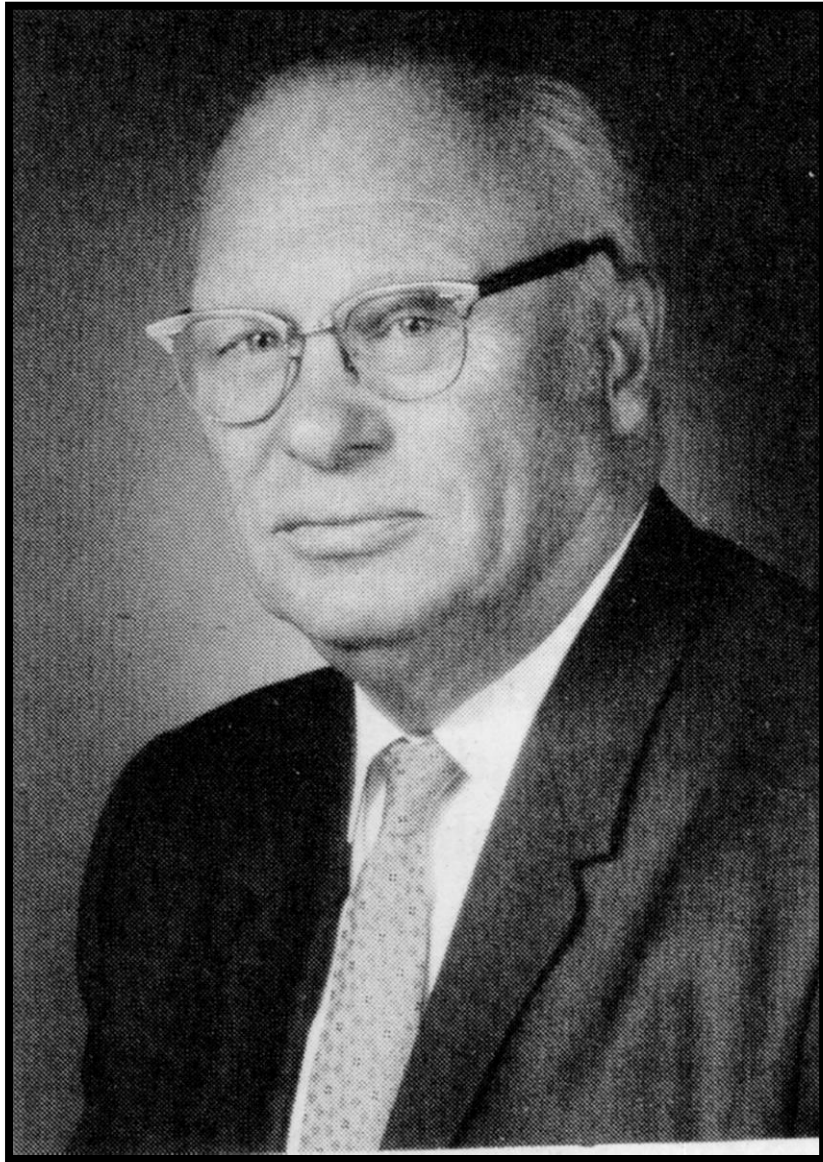
Early Planar Integrated Circuit



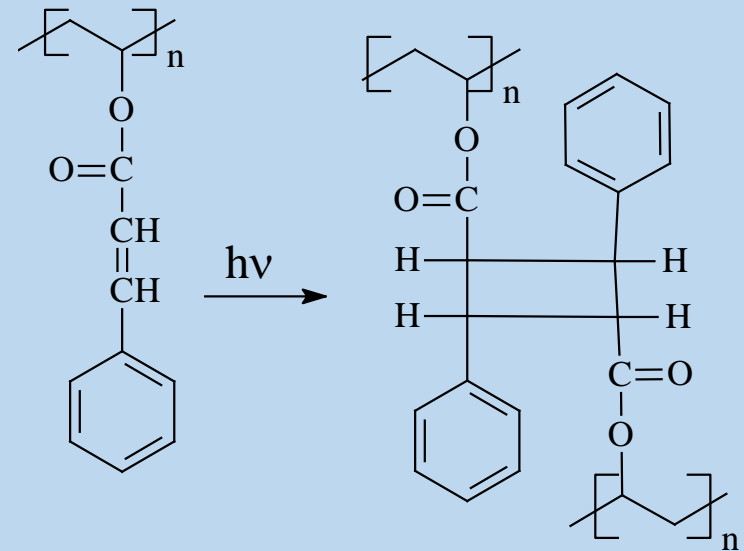
Shockley Noyce Ca. 1960



The First Synthetic Photopolymer



Louis Minsk
Eastman Kodak



Poly(vinyl cinnamate)

Adhesion Problems



Co-inventors of Kodak's KTFR

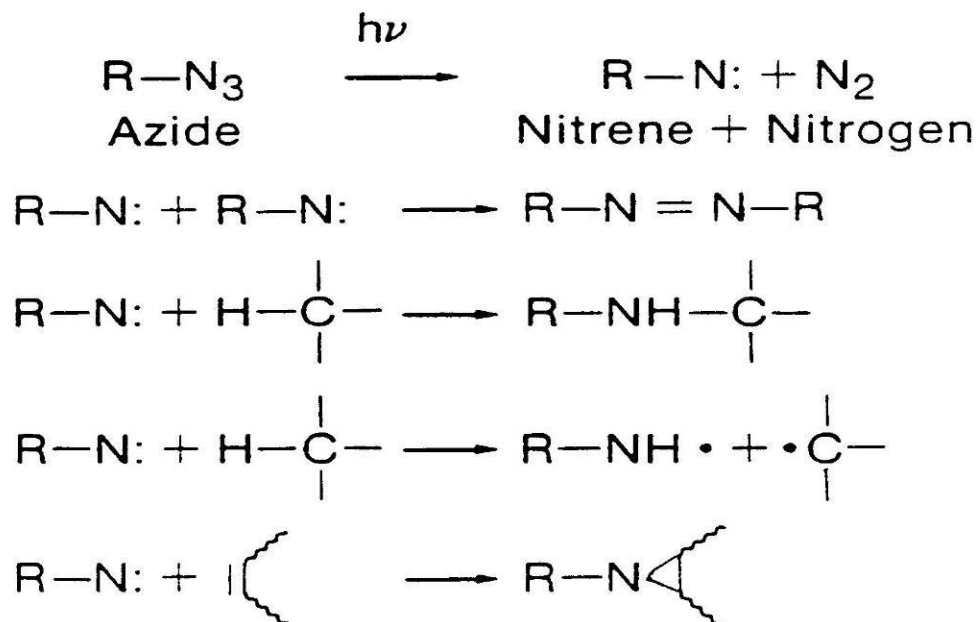
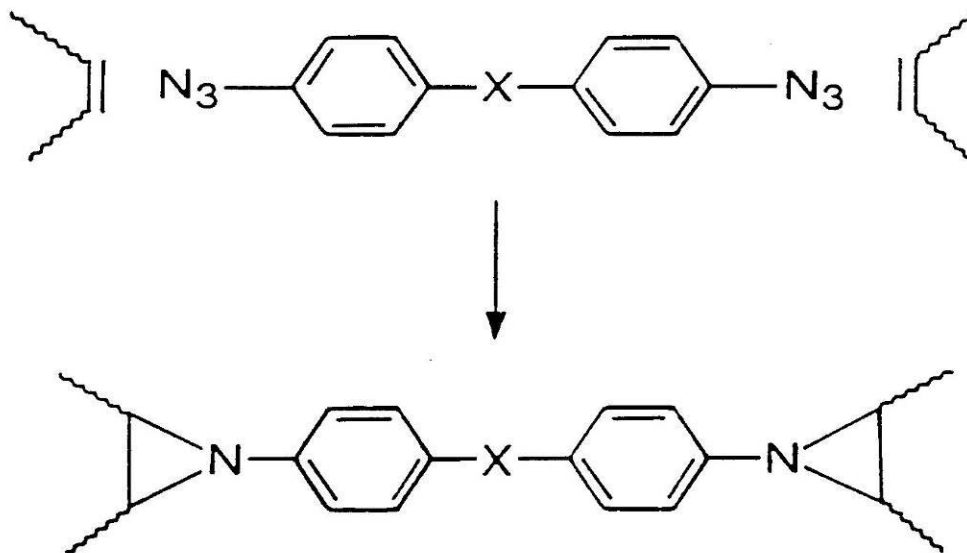


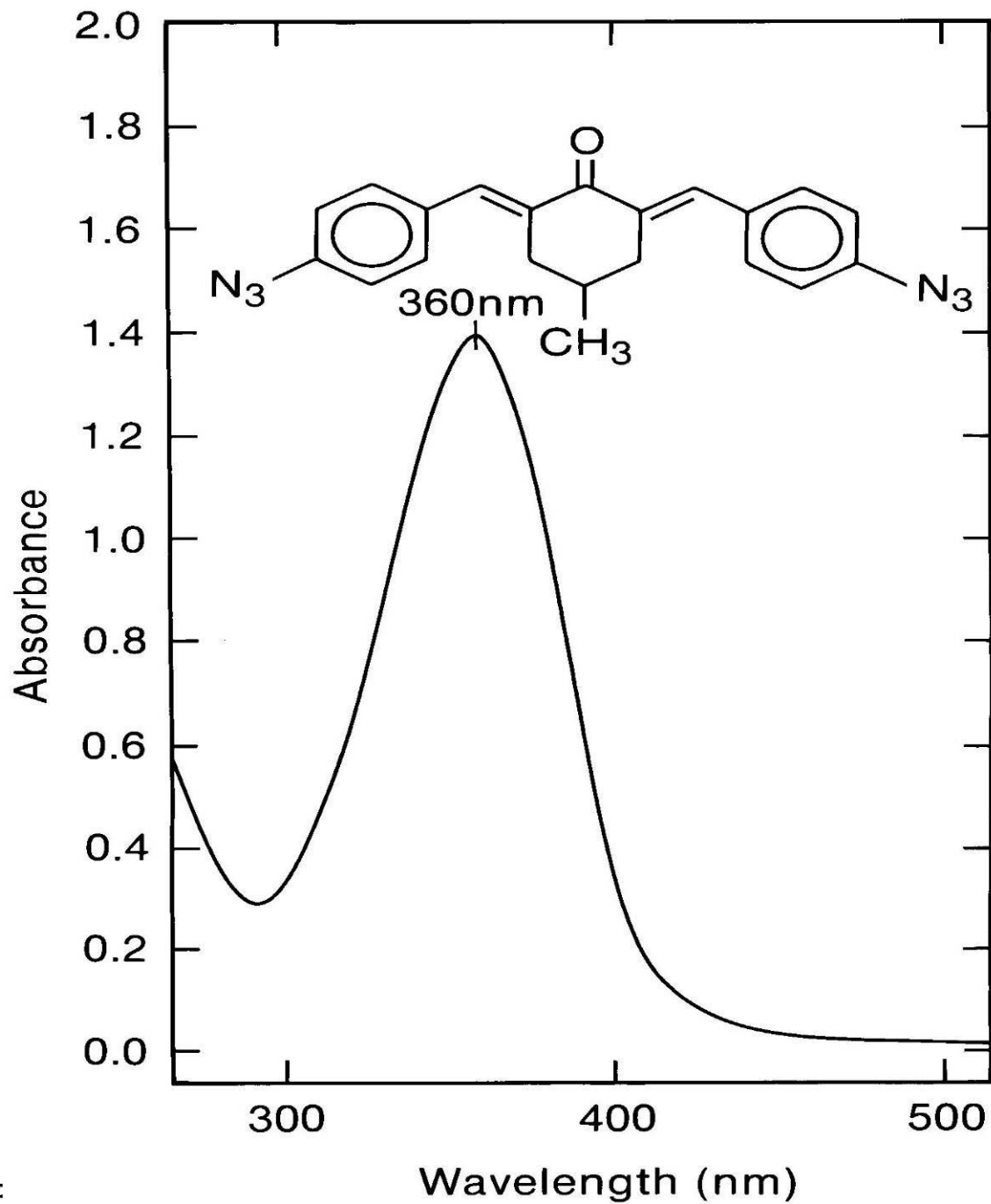
Martin Hapher



Hans Wagner







Swelling, Snakes, Ugh!!

