Curso propedéutico de Electrónica
INAOE 2010

Fundamentos de Dispositivos Electrónicos

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INAOE
microelectrónica

TEMARIO DEL CURSO DE FUNDAMENTOS DE DISPOSITIVOS ELECTRONICOS

1. Introducción a Física Electrónica

1.1 Propiedades de cristales y crecimiento de semiconductores

1.2 Átomos y electrones

1.3 Bandas de energía y portadores de carga en semiconductores

1.4 Exceso de portadores en semiconductores

2. Uniones

2.1 Fabricación de uniones p-n

2.2 Condiciones de equilibrio

2.3 Polarización de uniones en directa e inversa bajo condiciones de estado estacionario

2.4 Ruptura bajo polarización inversa

2.5 Condiciones de transitorio y a-c

2.6 Desviaciones de la teoría sencilla

2.7 Uniones metal-semiconductor

Bibliografía

- B.G. Streetman, *Solid State Electronic Devices*, Cuarta edición, Prentice-Hall, EUA, 1995.
- S. M. Sze, Semiconductor Devices: physics and technology, John Wiley and Sons, EUA, 1981.
- C-T. Sah, Fundamentals of solid-state electronics, World Scientific, Singapur, 1991.
- M. Shur, Introduction to Electronic Devices, John Wiley and Sons, EUA, 1996.
- J. Singh, Dispositivos Semiconductores, McGraw Hill, México 1997.
- S. Grove, Physics and technology of Semiconductor Devices, John Wiley and Sons, EUA, 1964.
- sitios de internet: http://jas.eng.buffalo.edu/
- http://www.nanohub.org/

Evaluación

7 exámenes 80%

Exámenes sorpresa 20%

Asistente del curso:

Por Confirmar

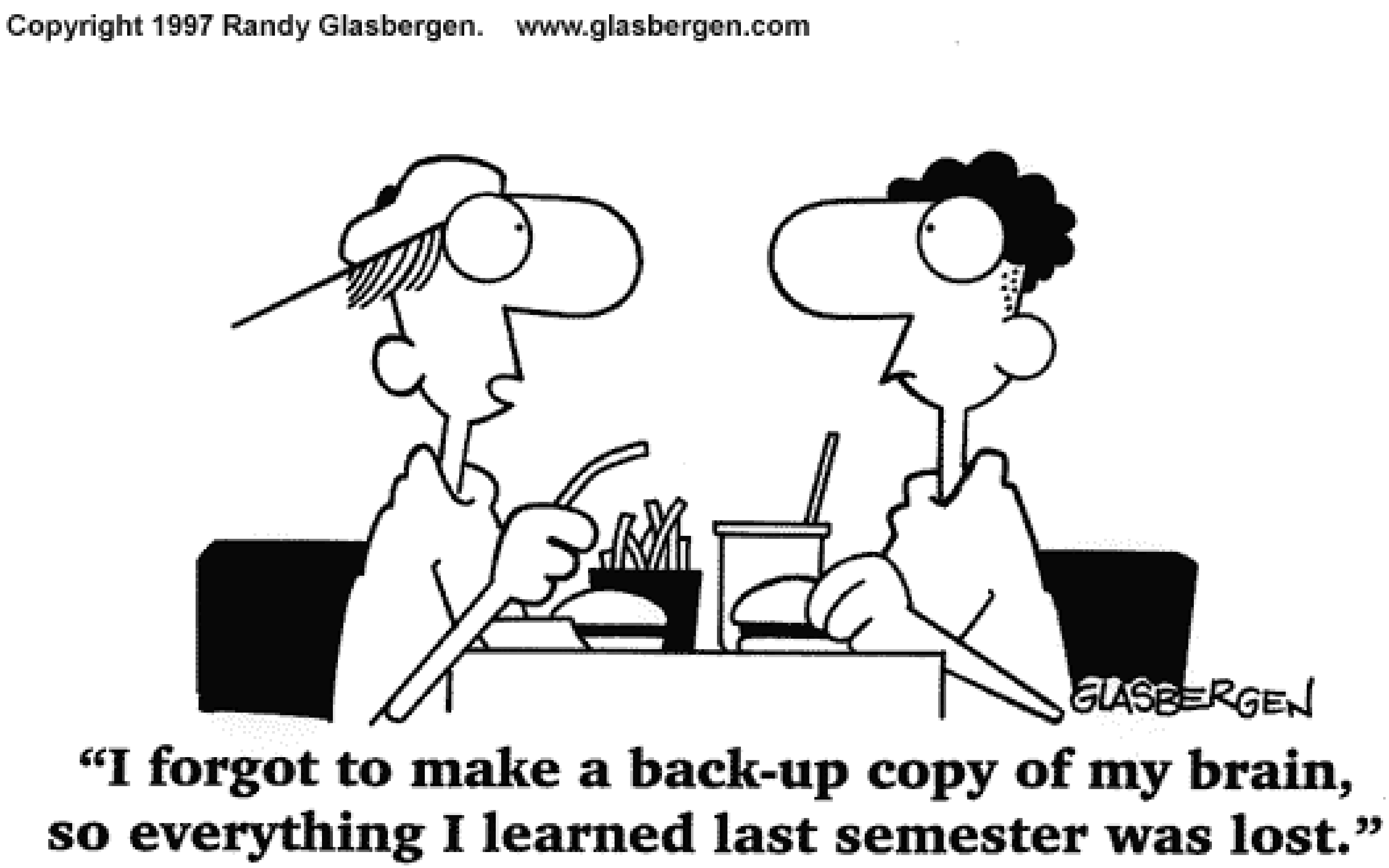
The aim of this curse

- In this course, we will focus mainly to the study of the devices made with crystalline semiconductors. Then, two properties of crystals will be of our particular interest, since they are necessary to determine the current in a semiconductor. With this structure:

- First, we need to know how many charges, fixed and free appear in the material.

- Second, we need to understand how the transport of the free charges through the semiconductor is carried out.

and third????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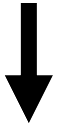
GLASBERGEN
"I forgot to make a back-up copy of my brain, so everything I learned last semester was lost."

Introduction

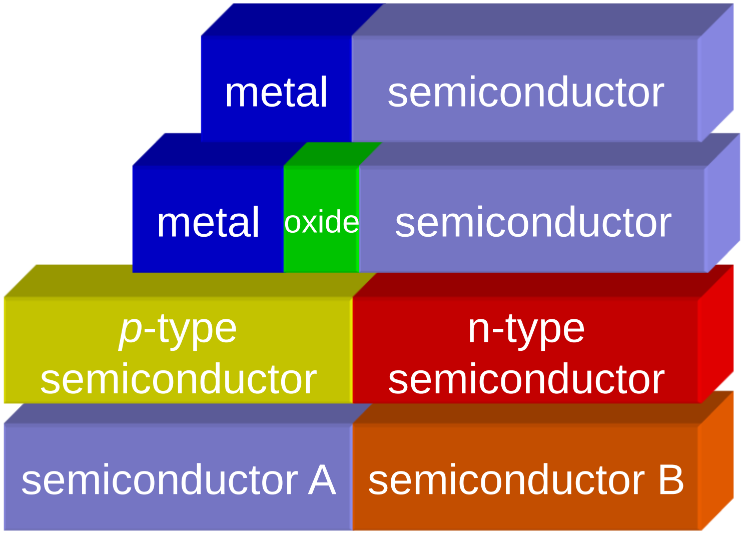
Semiconductor technology has changed our world…dramatically, e.g.







4 basic building blocks



e.g. MESFET

e.g. MOSFET

e.g. p-n junction, bipolar transistor

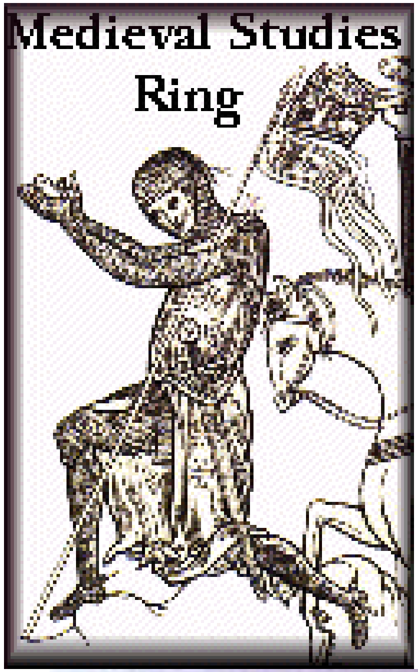
e.g. heterostructures, optoelectronics

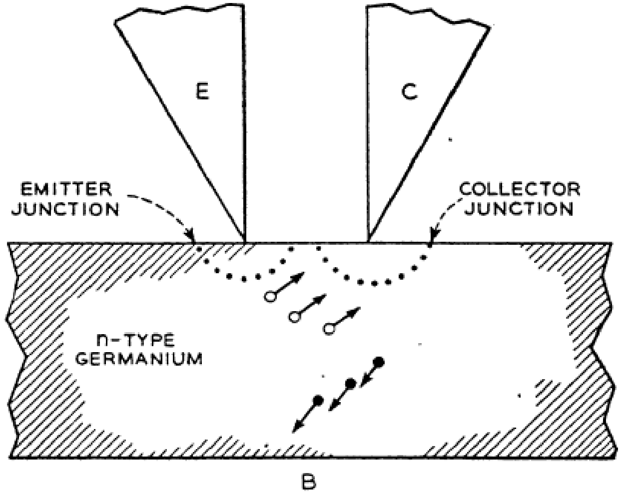
Semiconductor technology has changed our world

1940’s

man changing one of 18,000 tubes

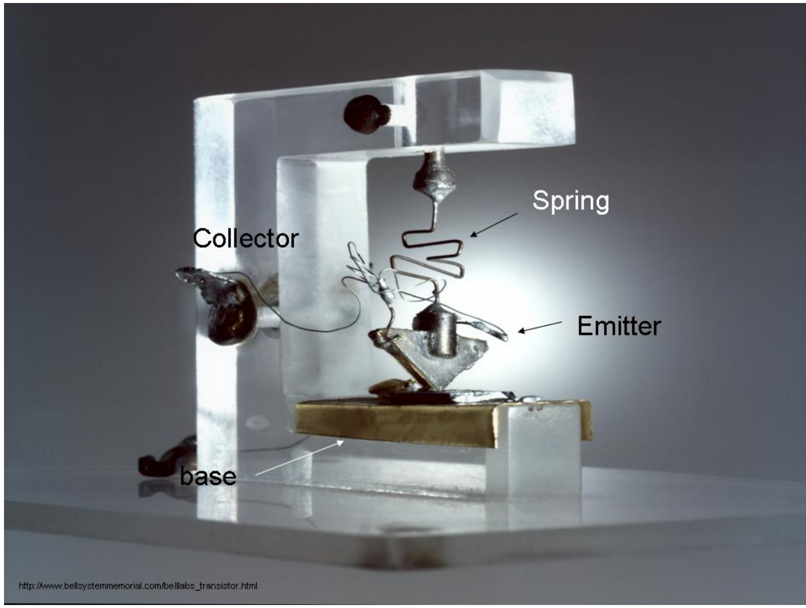
1950's

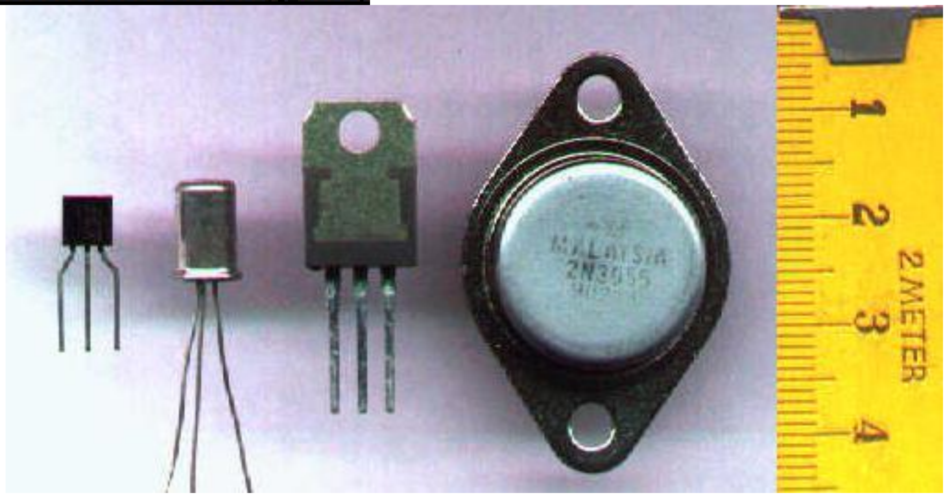


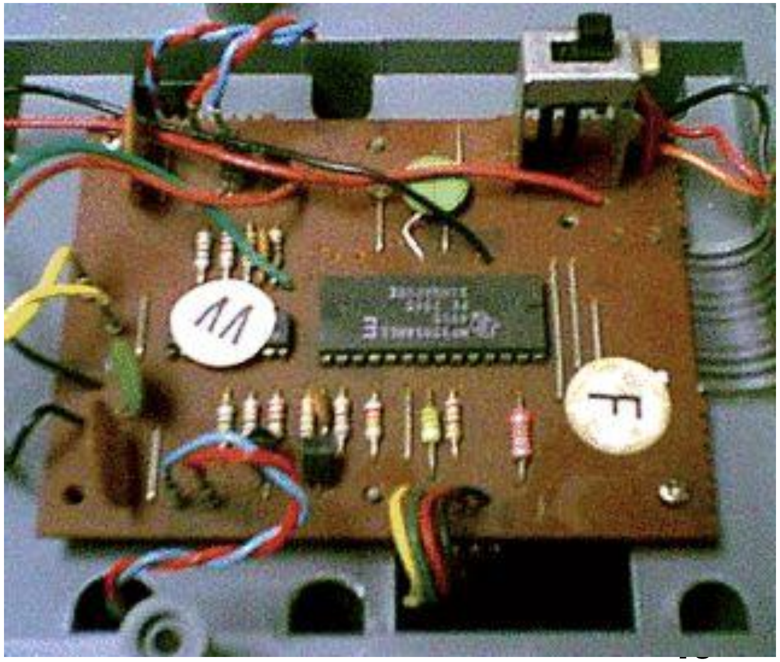


Morton 1952

Fig. 6.7 Principle of the point contact transistor





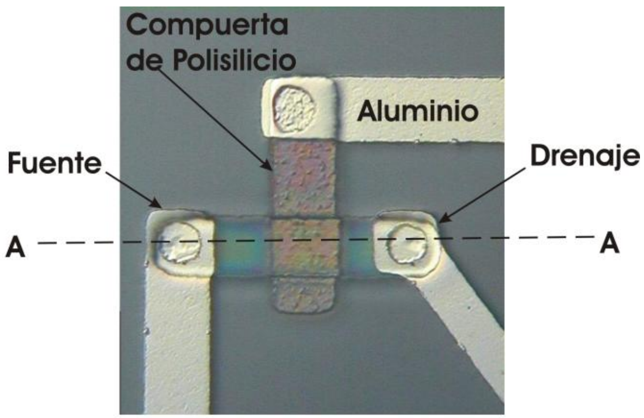


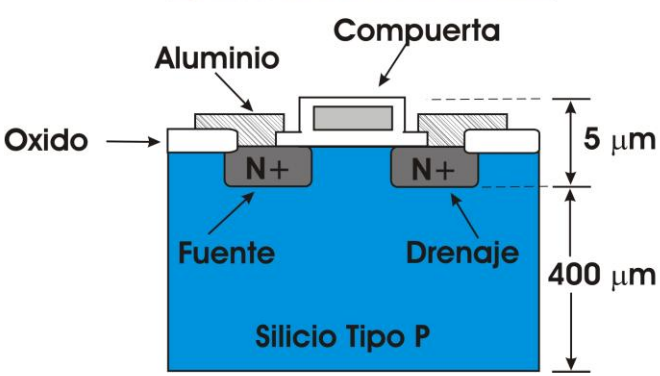
Microprocesador Pentium 4

2000

Área aproximada 200 mm^2 con 42 millones de componentes.

Chip ULSI con tecnología CMOS 0.18 μm, 6 niveles de aluminio





~1960

Texas Instruments' first IC

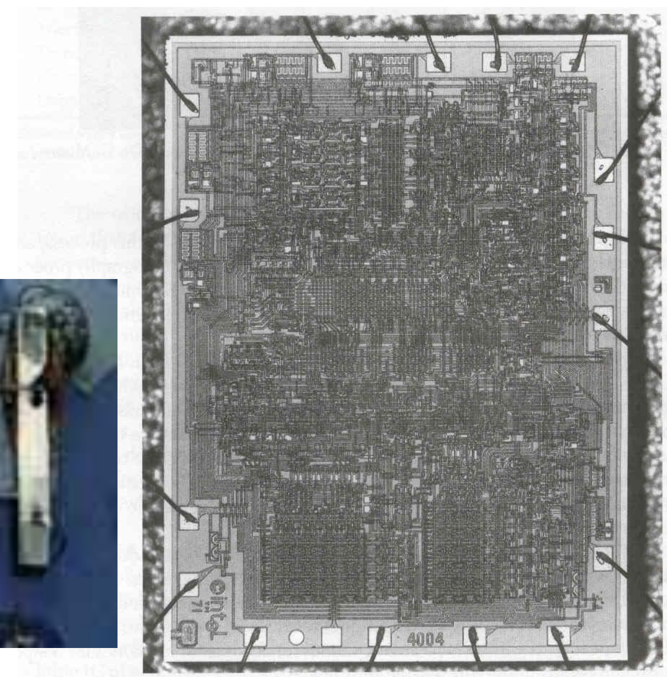
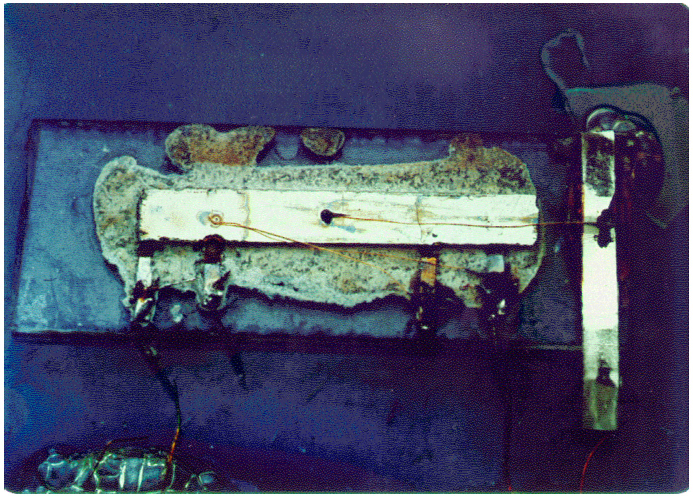
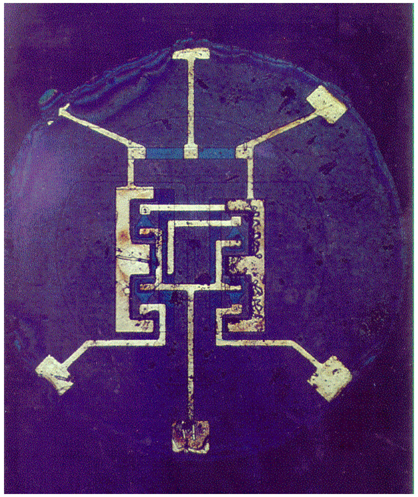


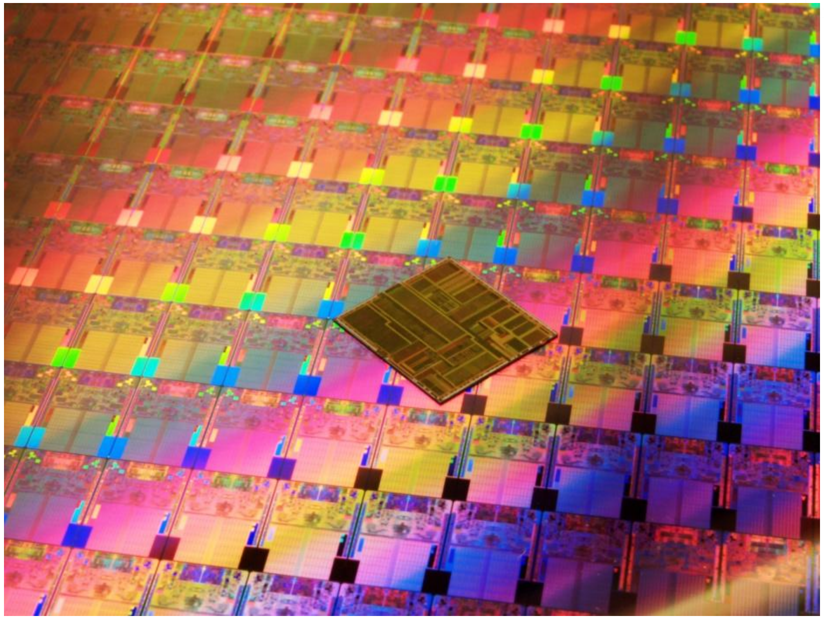
Fig. 7 The first microprocessor.[45] (Photograph courtesy of Intel Corp.)

1958





2007



Penryn Microprocessor

Initial clock speed

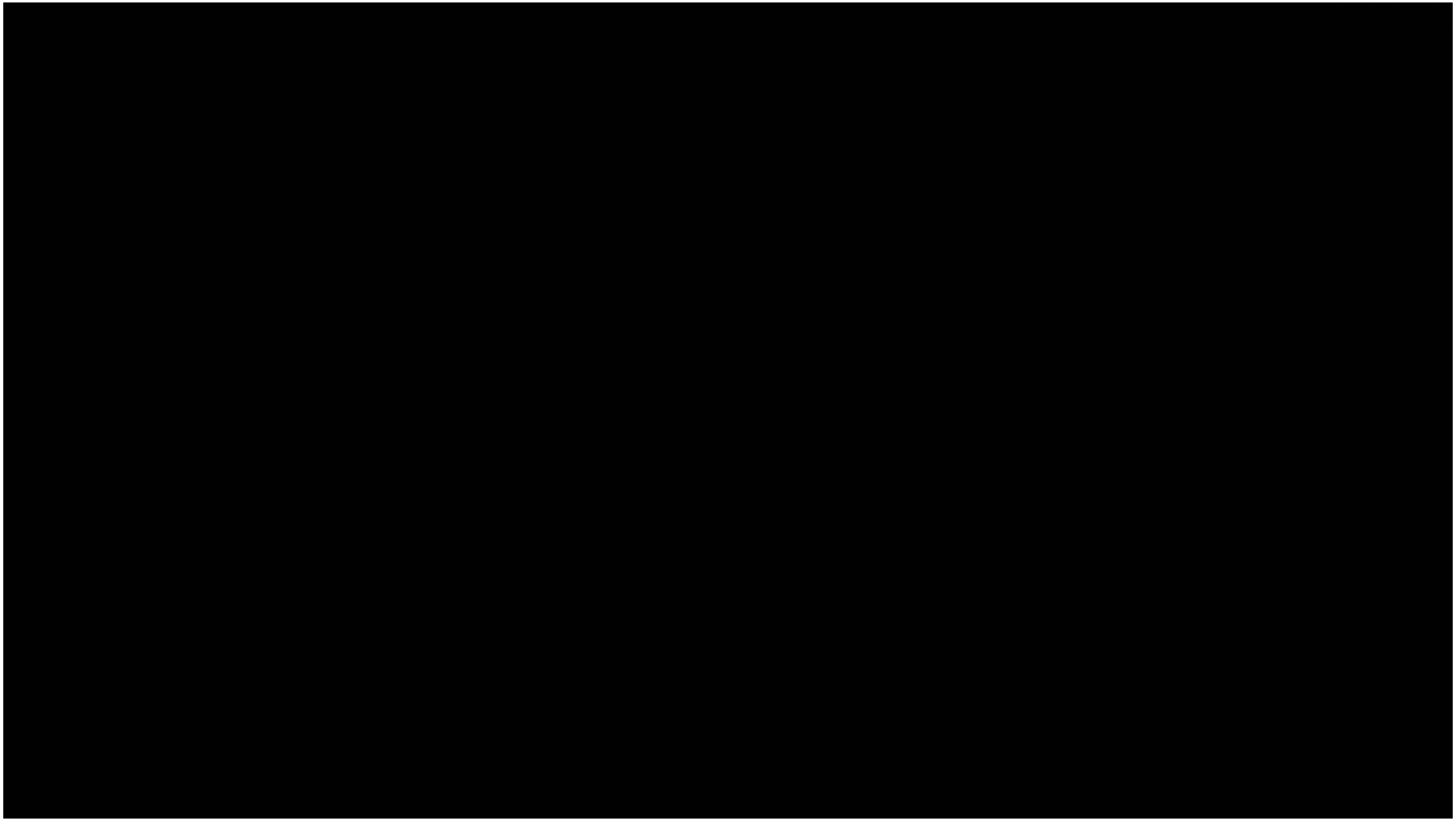
> 3 GHz

Number of transistors

820,000,000

Manufacturing technology

45 nm



Tour Fab 32, Intel's New 45nm Factory