

# flash memory

## EPR0M

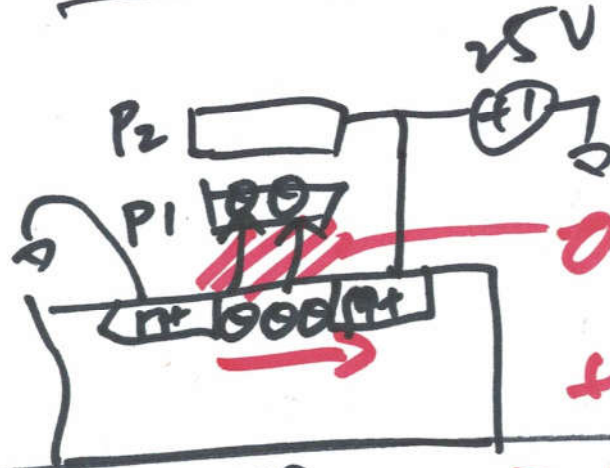
Program

Erase

Ultra violet  
light

CHE

channel  
hot  
Electrons



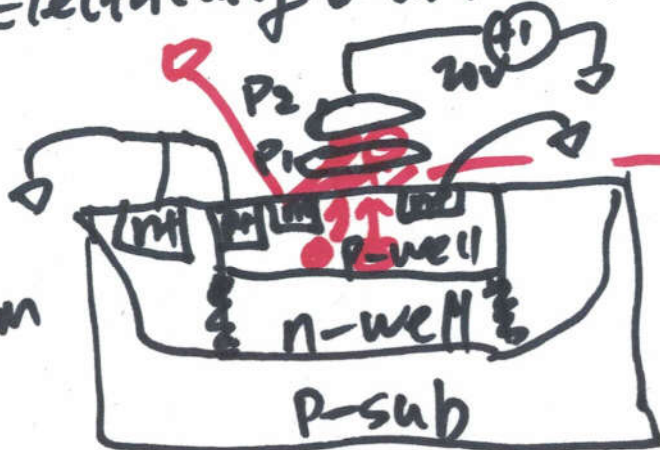
oxide  
↓  
thick

EEPROM → flash

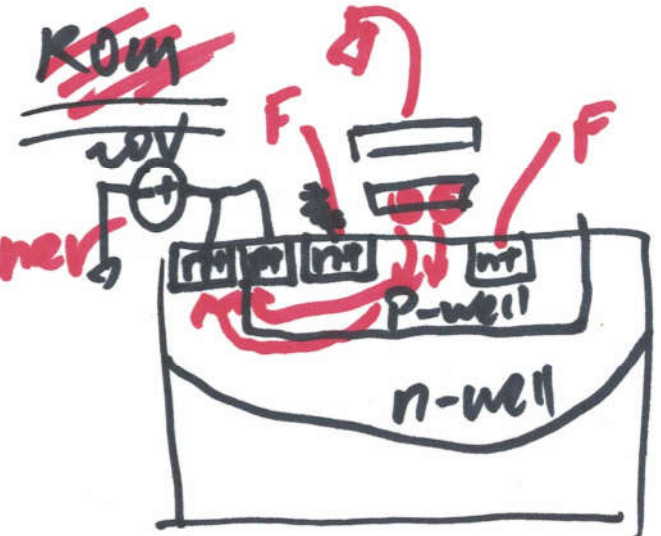
Electrically erasable Programmable ROM

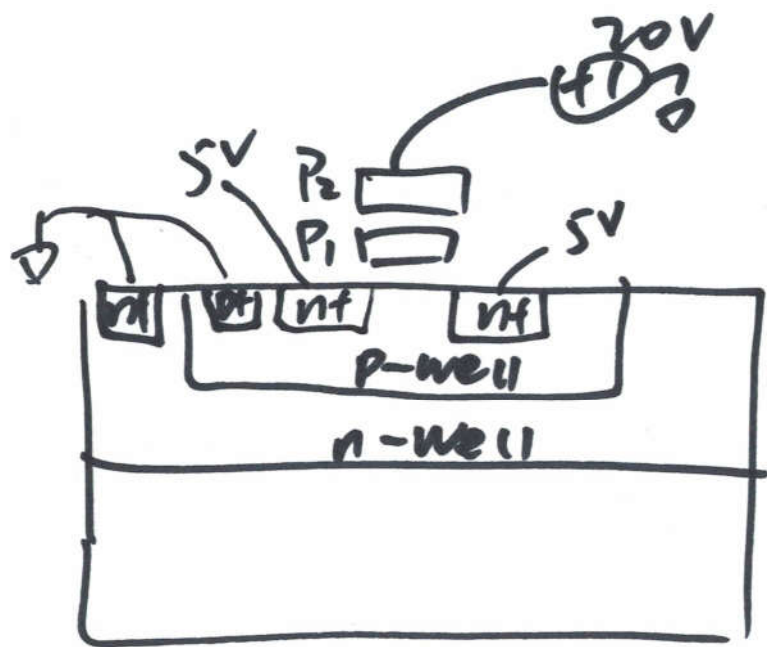
FNT

Fowler ~~Nordheim~~  
Tunneling

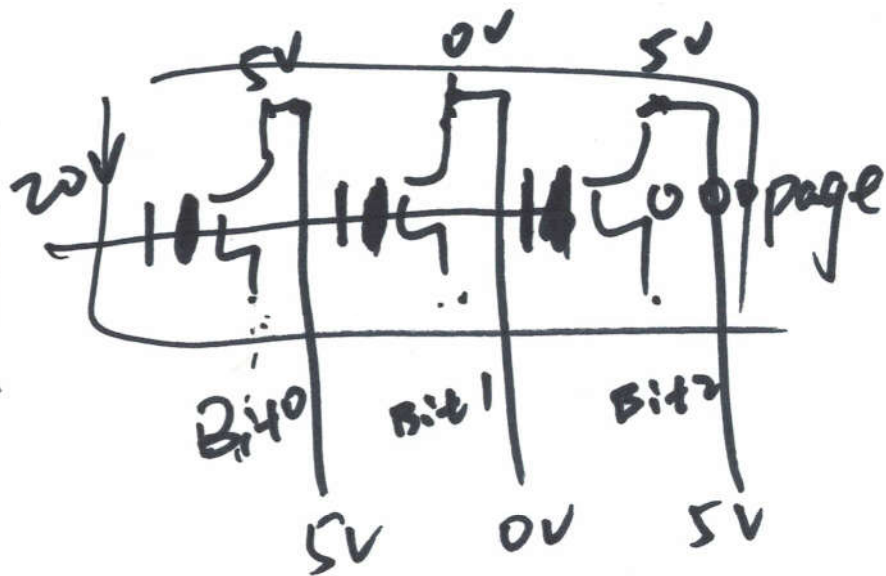


thinner

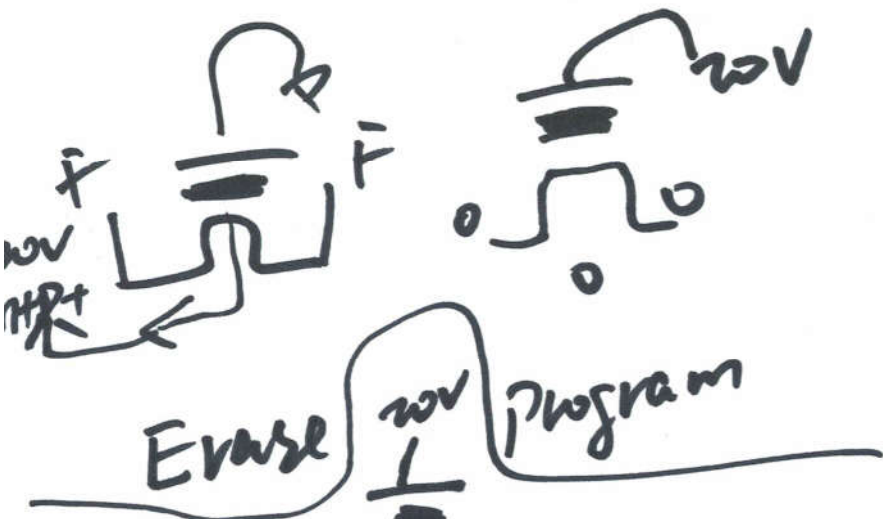




Don't Program



NAND flash

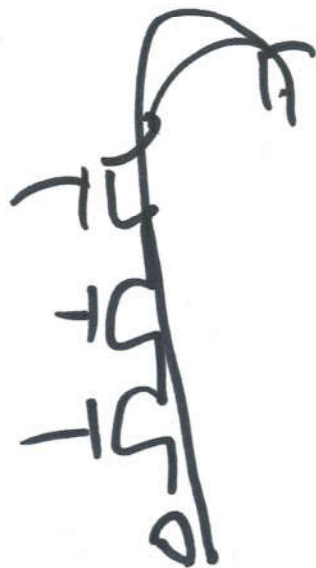


Erase

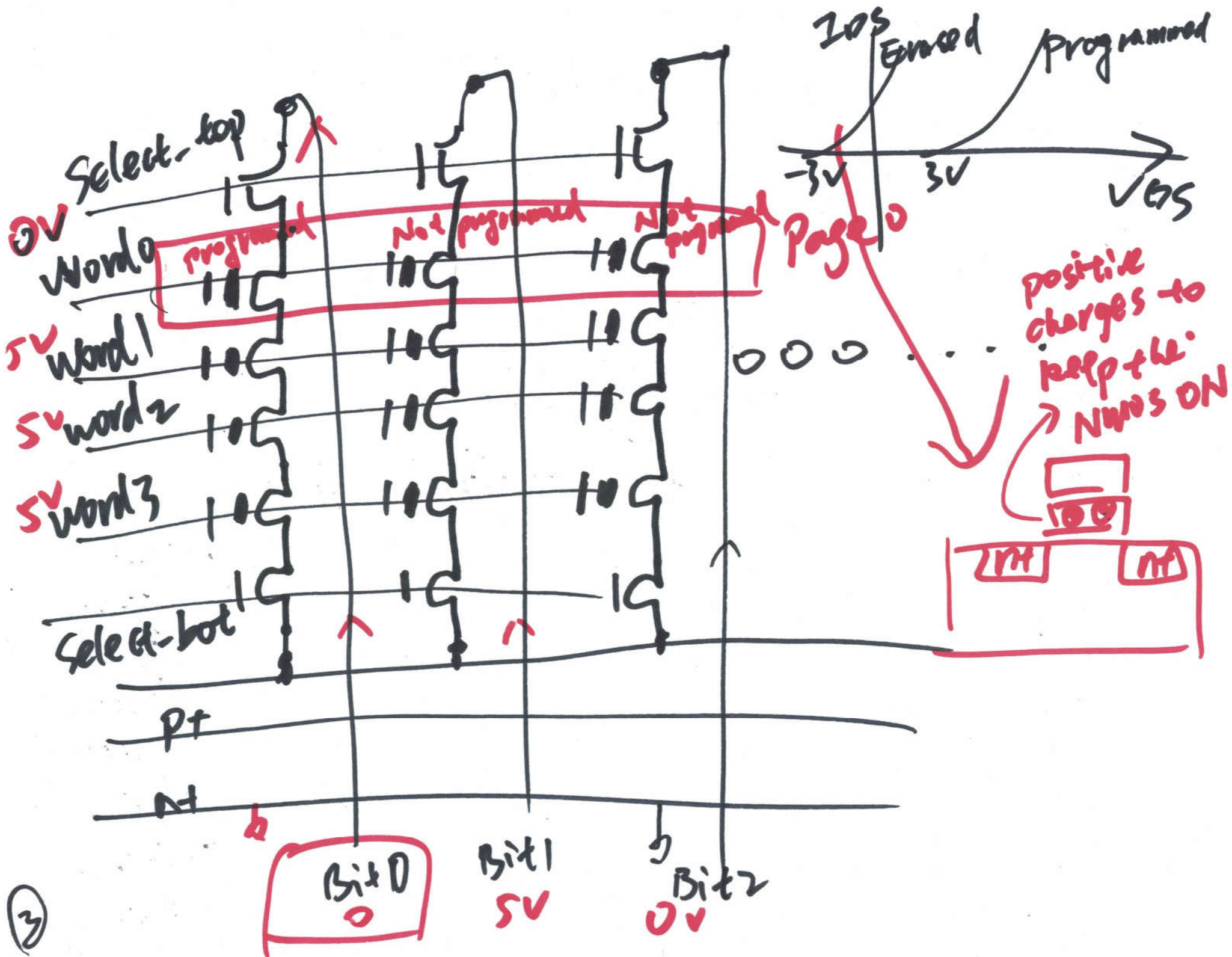
Program



Don't program



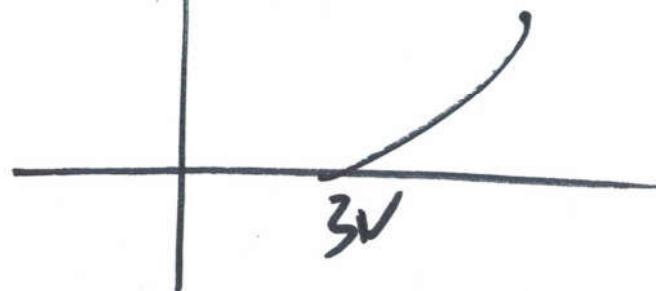
2



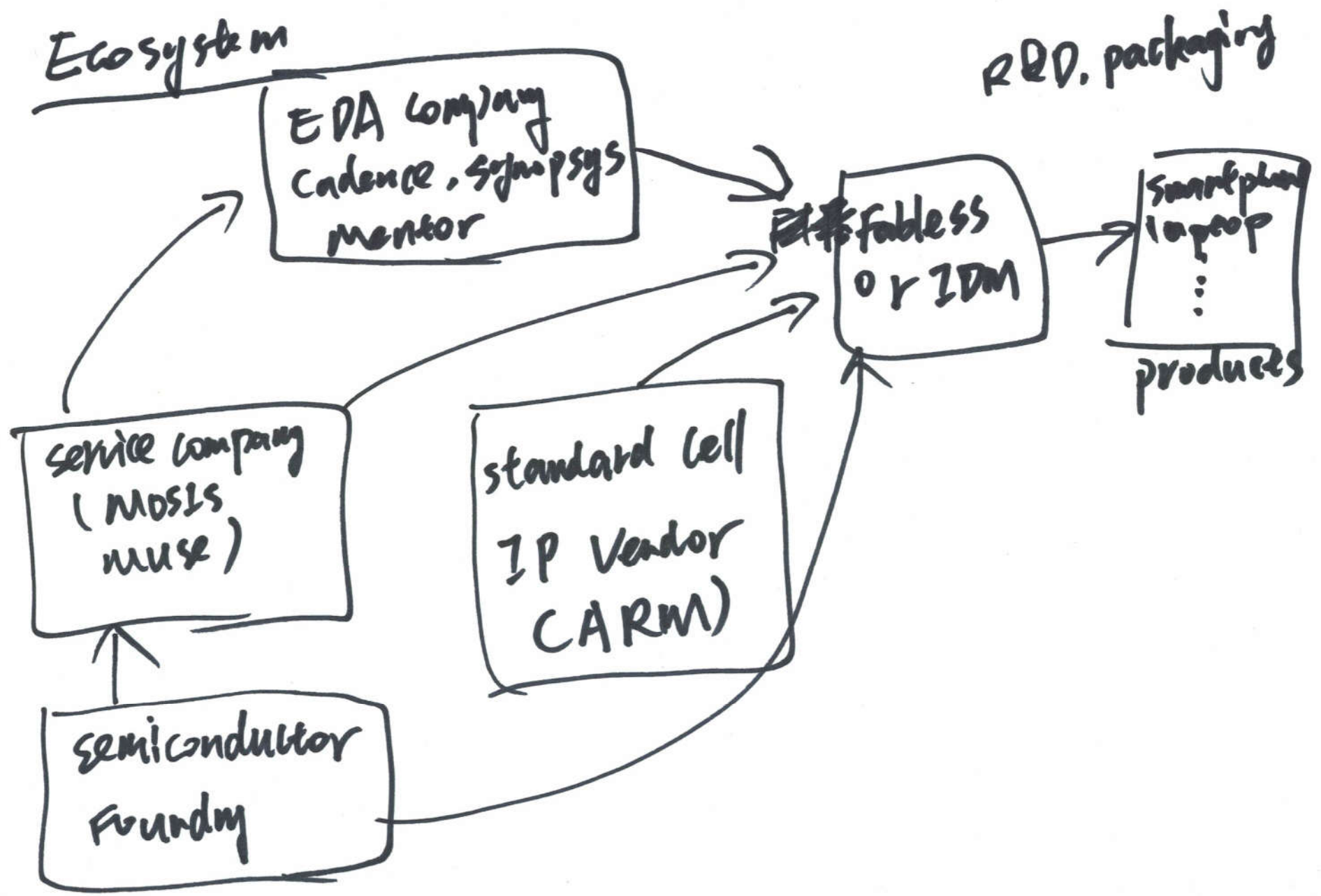
3



	Erase	Program	Read
Bitline	Float	0V	H/L
select-top	0V	20V	
word0	0V	20V	5V
word1	0V	5V	0V
word2	0V	5V	5V
word3	0V	5V	5V
select-bot	0V	5V	5V
nt source	Float	0V	0V
P+ well tied down	20V	0V	0V



# The Semiconductor Industry



(S)

fabless: Qualcomm, Nvidia, AMD (No foundries)

IDM: Integrated Device Manufacturer

(Have foundries) Intel, TI, Micron, Samsung.

fabless:

Company	Country	Revenue (Million \$)
Broadcomm	US	17,246
Qualcomm	US	14,518
Nvidia	US	12,125
MediaTek	Taiwan	7,962
AMD	US	6,731