FIG. 1

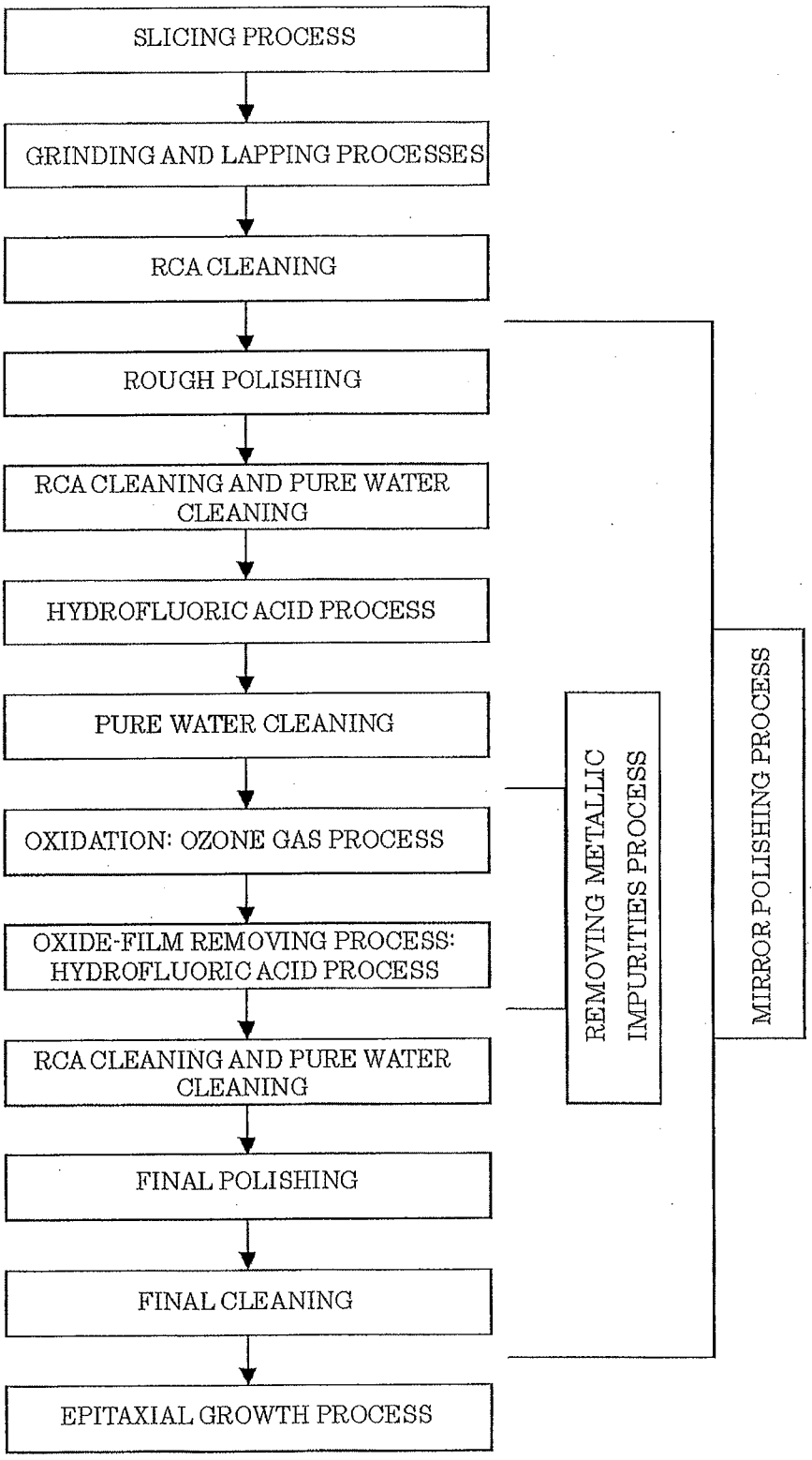

SLICING PROCESS
GRINDING AND LAPPING PROCESSES
RCA CLEANING
ROUGH POLISHING
RCA CLEANING AND PURE WATER CLEANING
HYDROFLUORIC ACID PROCESS
PURE WATER CLEANING
OXIDATION: OZONE GAS PROCESS
OXIDE-FILM REMOVING PROCESS: HYDROFLUORIC ACID PROCESS
RCA CLEANING AND PURE WATER CLEANING
FINAL POLISHING
FINAL CLEANING
EPITAXIAL GROWTH PROCESS
REMOVING METALLIC IMPURITIES PROCESS
MIRROR POLISHING PROCESS

FIG. 2

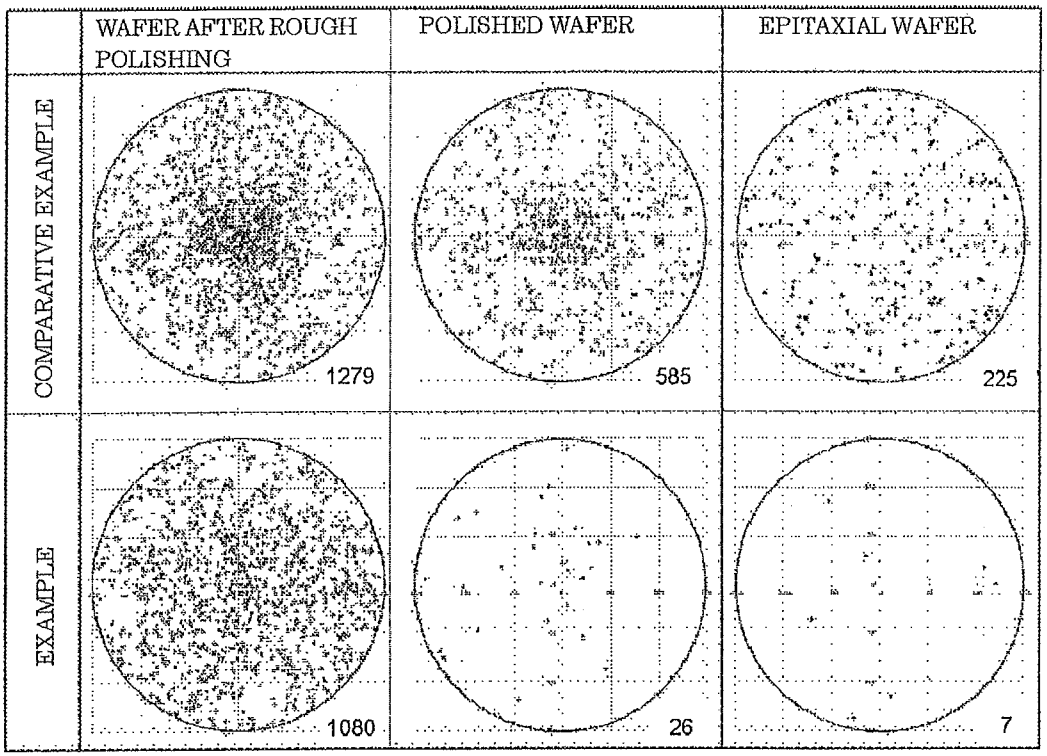
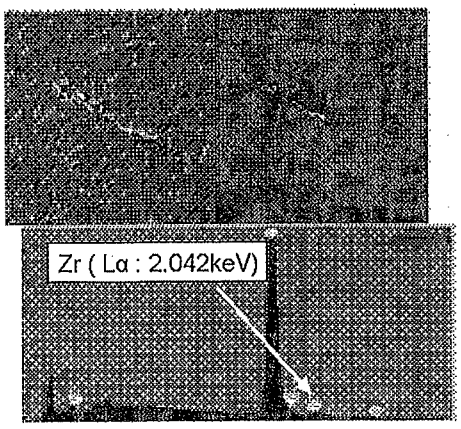

WAFER AFTER ROUGH POLISHING
POLISHED WAFER
EPITAXIAL WAFER
COMPARATIVE EXAMPLE
EXAMPLE
1279
585
225
1080
26
7

FIG. 3

(A)


Zr (Lα : 2.042keV)

(B)

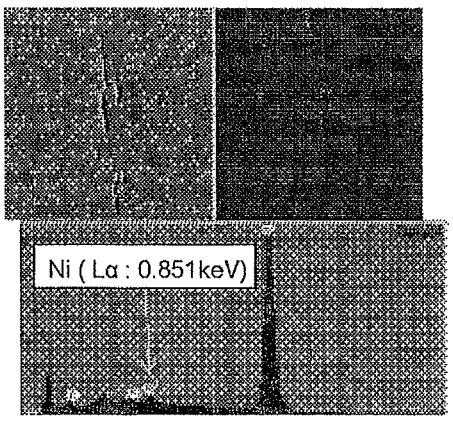

Ni (Lα : 0.851keV)

FIG. 4

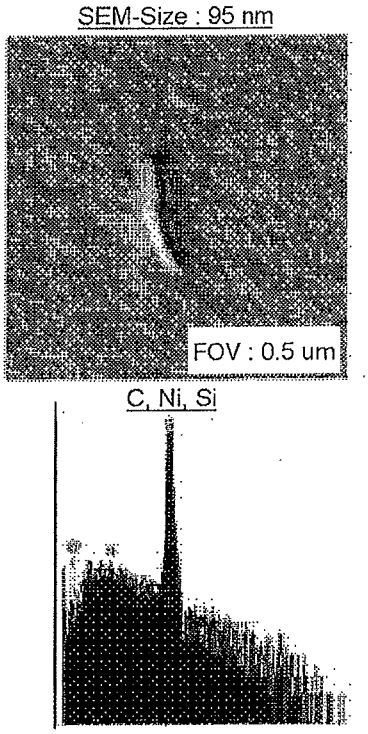

SEM-Size : 95 nm
FOV : 0.5 um
C, Ni, Si

FIG. 5

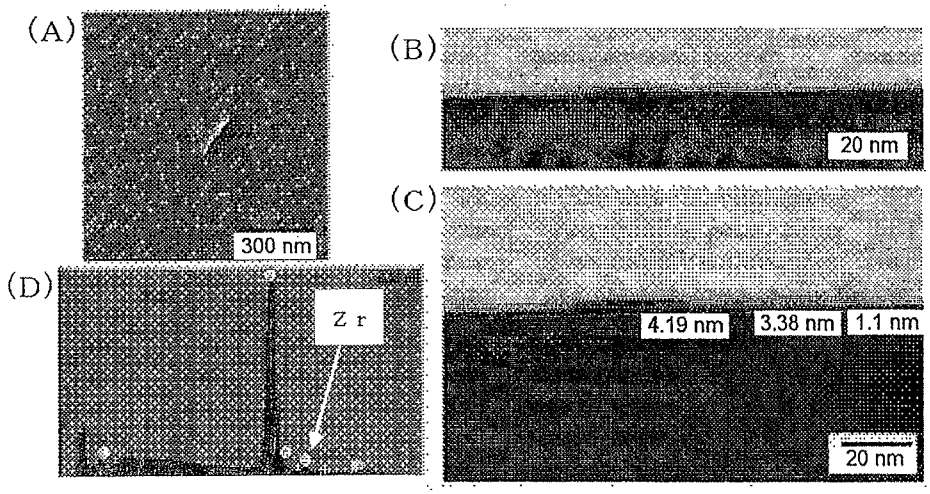

(A)
300 nm
(B)
20 nm
(C)
4.19 nm
3.38 nm
1.1 nm
20 nm
(D)
Zr

FIG. 6

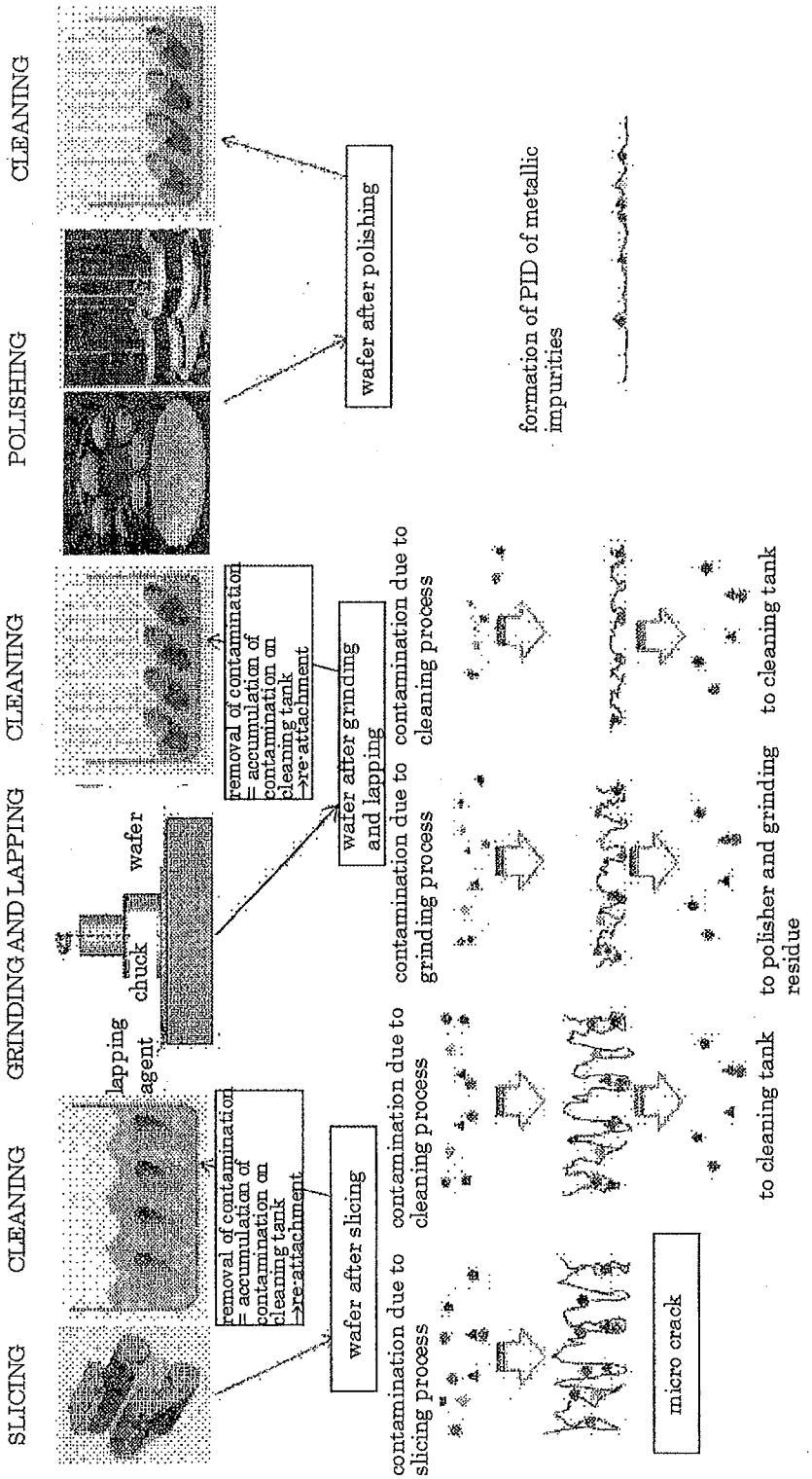

SLICING
CLEANING
GRINDING AND LAPPING
CLEANING
POLISHING
CLEANING
lapping agent
chuck
wafer
removal of contamination
= accumulation of contamination on cleaning tank
→re-attachment
wafer after slicing
wafer after grinding and lapping
wafer after polishing
contamination due to slicing process
contamination due to cleaning process
contamination due to grinding process
contamination due to cleaning process
formation of PID of metallic impurities
micro crack
to cleaning tank
to polisher and grinding residue
to cleaning tank

FIG. 7

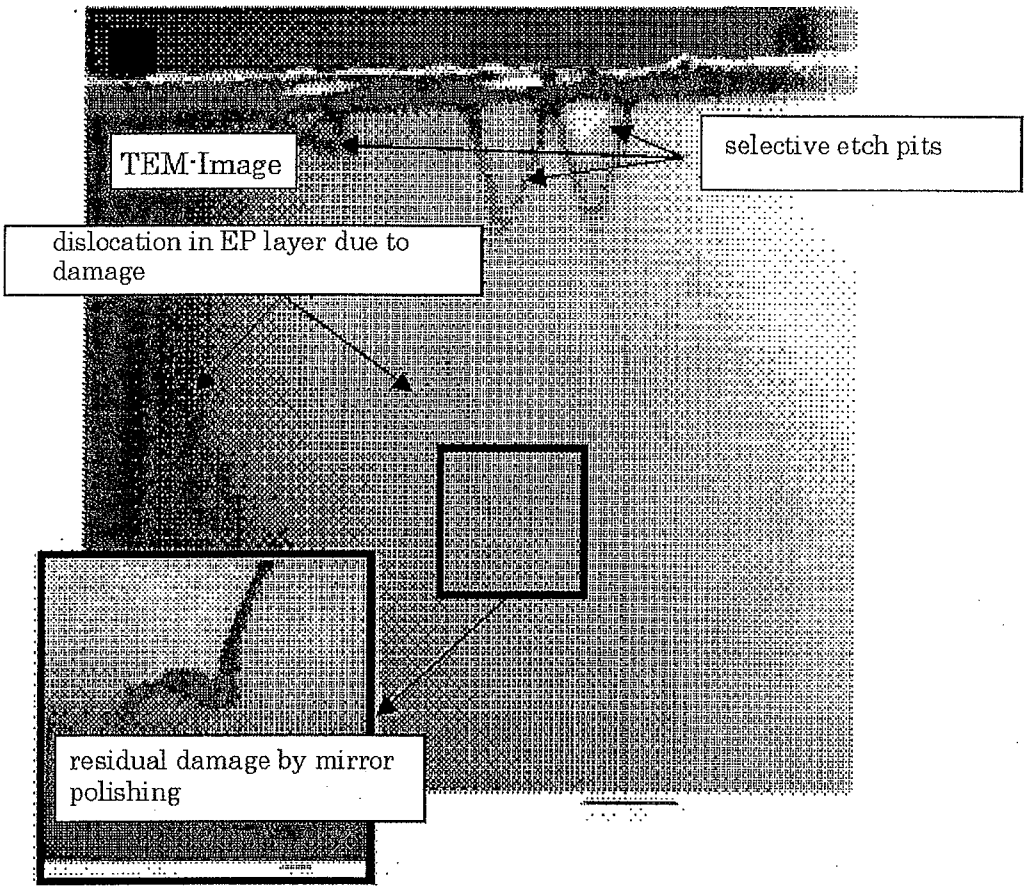
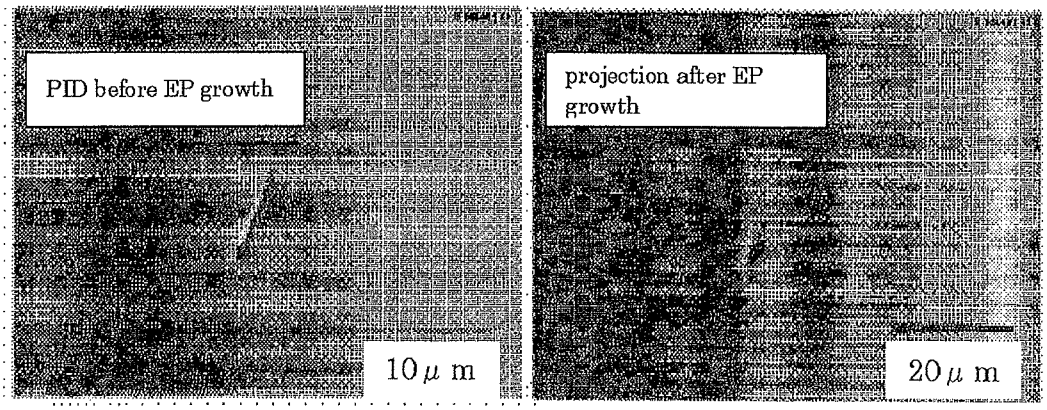

TEM-Image
selective etch pits
dislocation in EP layer due to damage
residual damage by mirror polishing

FIG. 8

(A) (B)


PID before EP growth
10 μ m
projection after EP growth
20 μ m

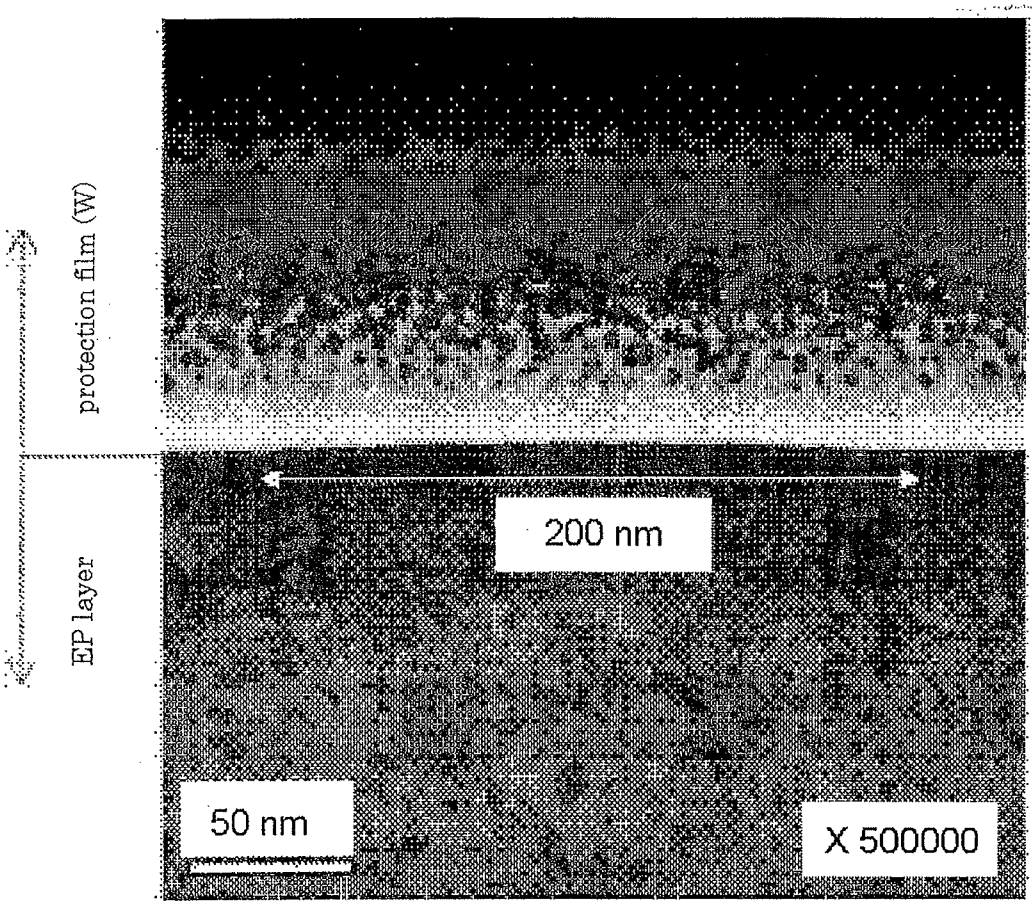



FIG. 9