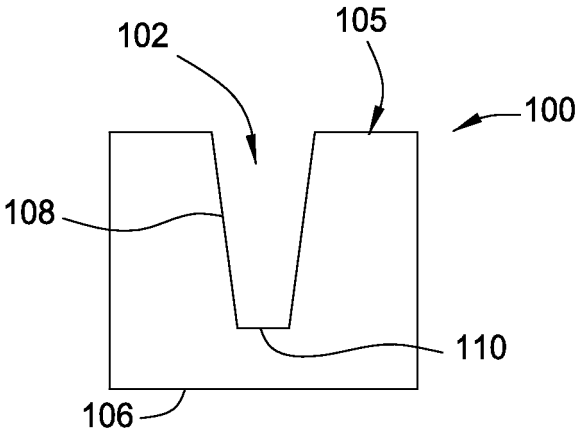


FIG. 1A

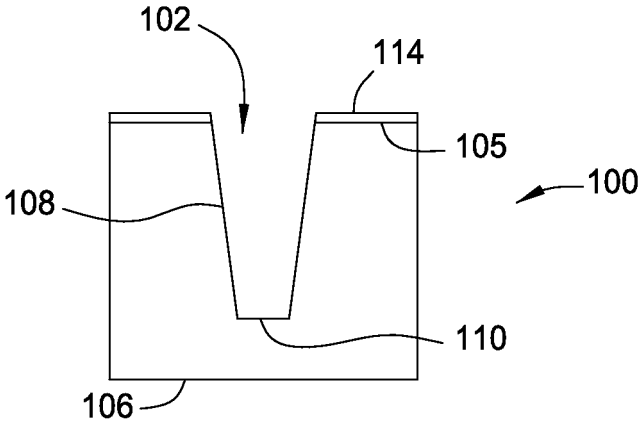


FIG. 1B

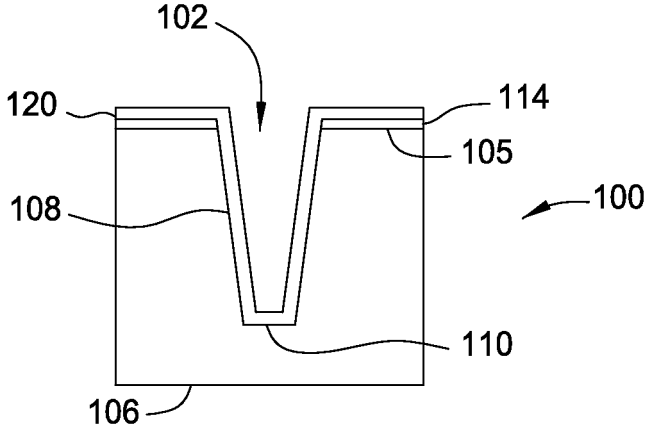


FIG. 1C

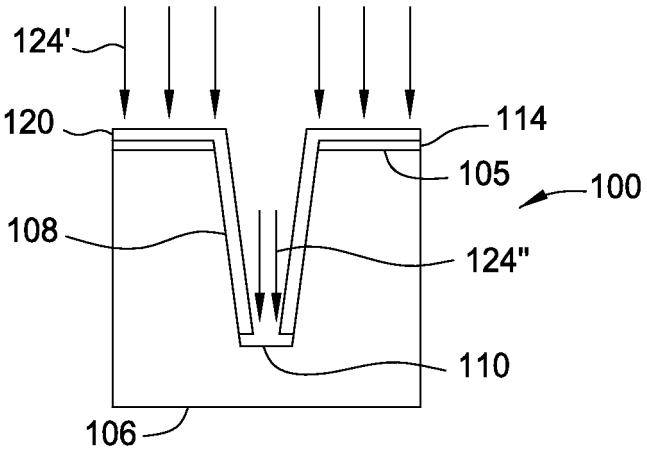


FIG. 1D

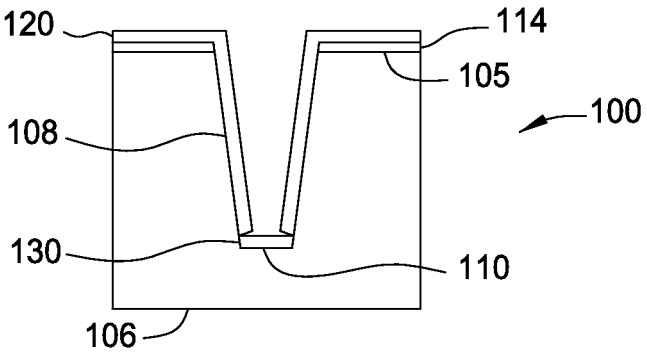


FIG. 1E

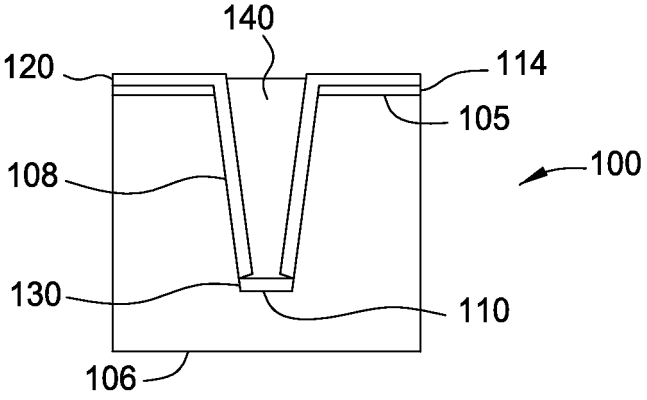


FIG. 1F

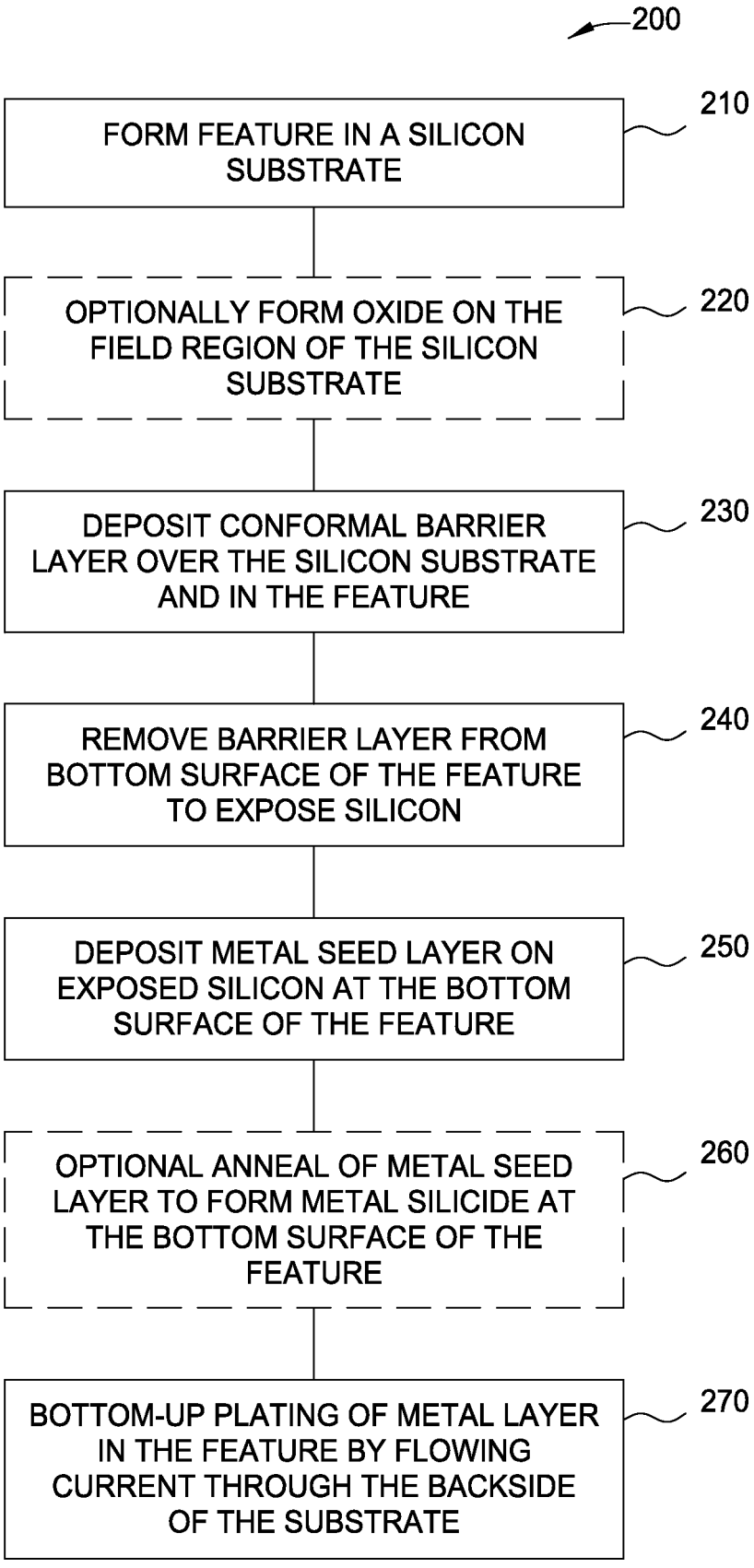

200
FORM FEATURE IN A SILICON SUBSTRATE
210
OPTIONALLY FORM OXIDE ON THE FIELD REGION OF THE SILICON SUBSTRATE
220
DEPOSIT CONFORMAL BARRIER LAYER OVER THE SILICON SUBSTRATE AND IN THE FEATURE
230
REMOVE BARRIER LAYER FROM BOTTOM SURFACE OF THE FEATURE TO EXPOSE SILICON
240
DEPOSIT METAL SEED LAYER ON EXPOSED SILICON AT THE BOTTOM SURFACE OF THE FEATURE
250
OPTIONAL ANNEAL OF METAL SEED LAYER TO FORM METAL SILICIDE AT THE BOTTOM SURFACE OF THE FEATURE
260
BOTTOM-UP PLATING OF METAL LAYER IN THE FEATURE BY FLOWING CURRENT THROUGH THE BACKSIDE OF THE SUBSTRATE
270

FIG. 2

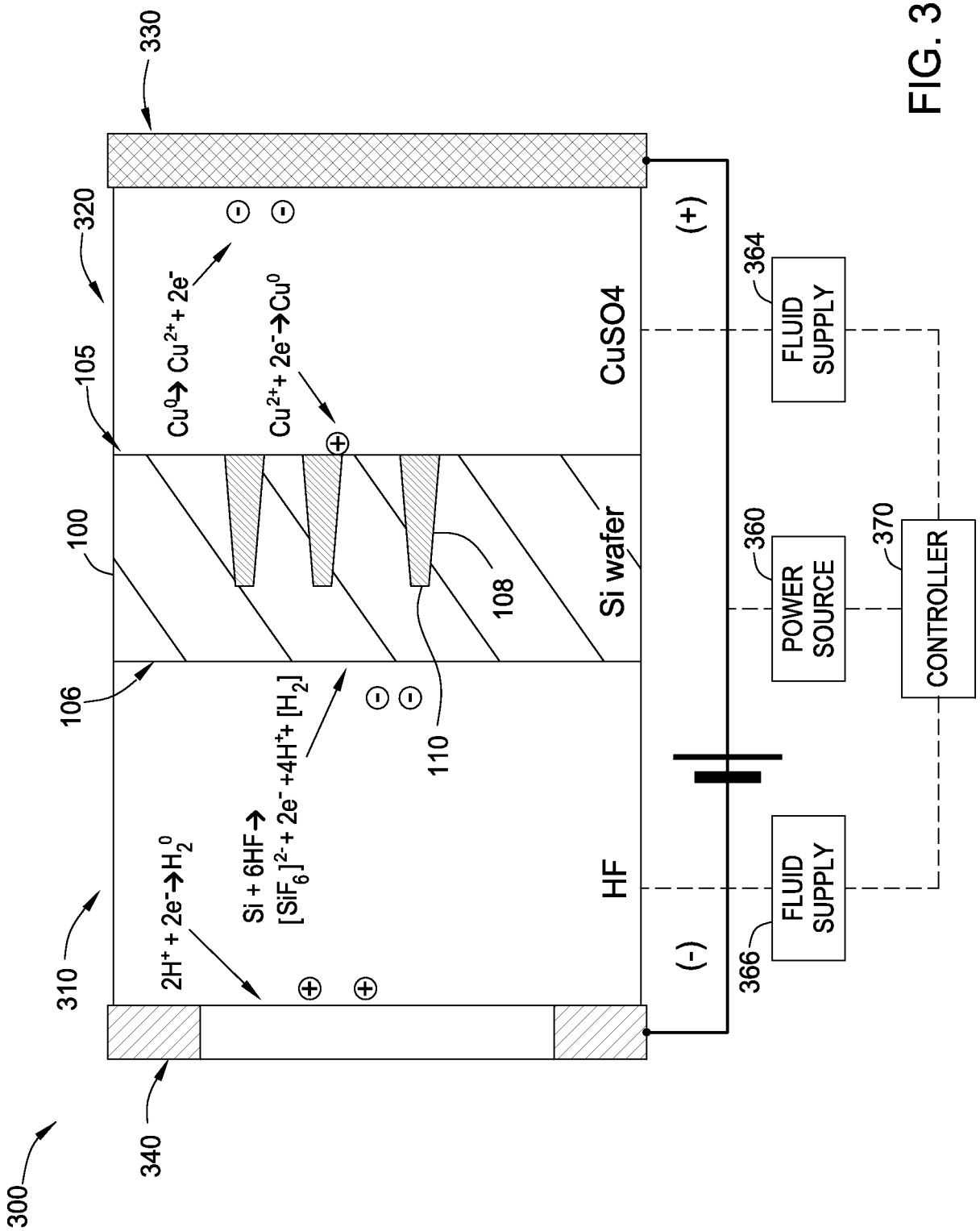

330
320
105
100
106
310
340
300
$Cu^0 \rightarrow Cu^{2+} + 2e^-$
$Cu^{2+} + 2e^- \rightarrow Cu^0$
$2H^+ + 2e^- \rightarrow H_2^0$
$Si + 6HF \rightarrow [SiF_6]^{2-} + 2e^- + 4H^+ + [H_2]$
CuSO4
HF
Si wafer
108
110
(+)
(-)
364
FLUID SUPPLY
360
POWER SOURCE
370
CONTROLLER
366
FLUID SUPPLY

FIG. 3

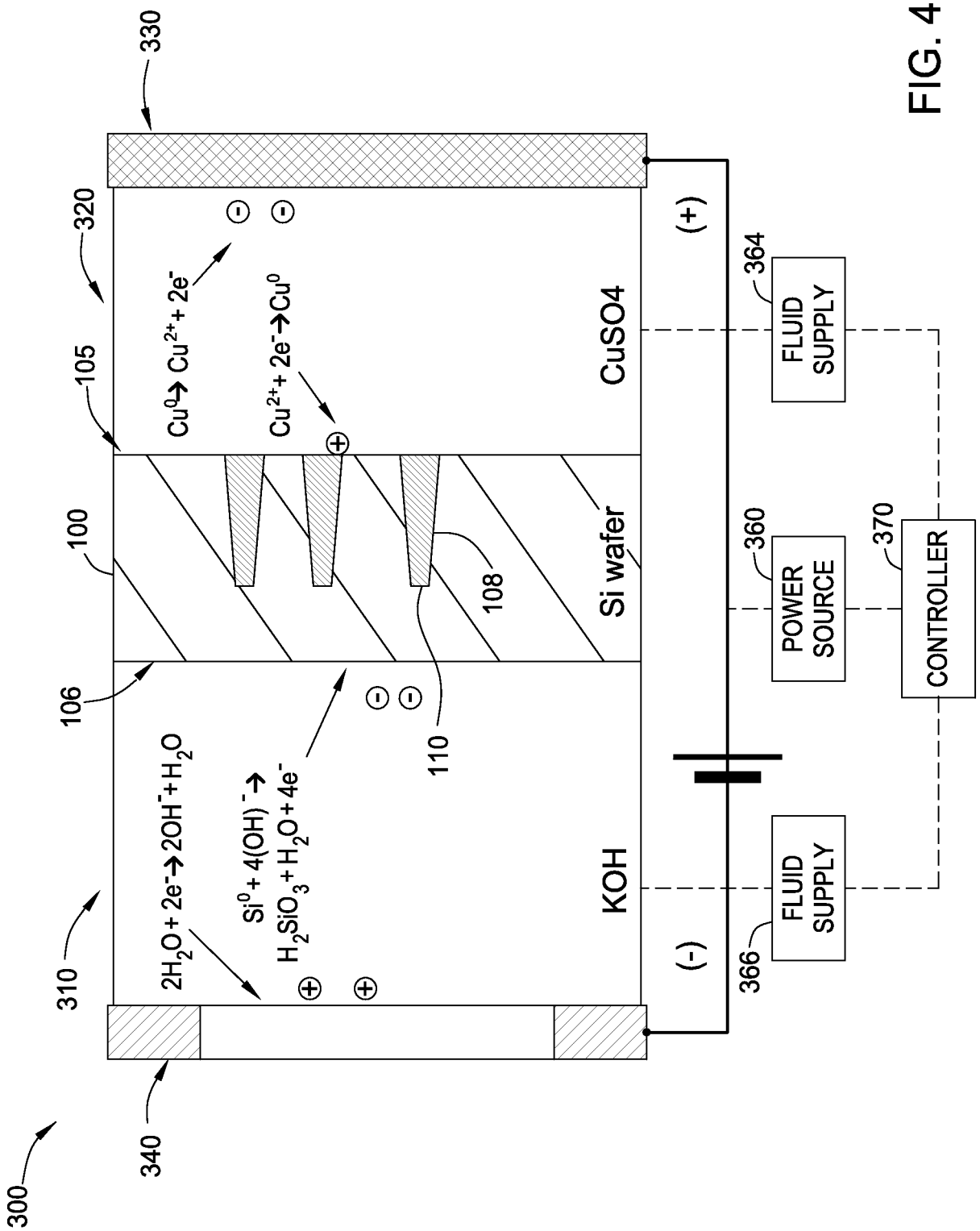

330
320
105
100
106
310
340
300
$Cu^0 \rightarrow Cu^{2+} + 2e^-$
$Cu^{2+} + 2e^- \rightarrow Cu^0$
CuSO4
Si wafer
KOH
108
110
$2H_2O + 2e^- \rightarrow 2OH^- + H_2O$
$Si^0 + 4(OH)^- \rightarrow H_2SiO_3 + H_2O + 4e^-$
(+)
(-)
364
FLUID SUPPLY
360
POWER SOURCE
370
CONTROLLER
366
FLUID SUPPLY

FIG. 4