DEFECT CHARACTERIZATION OF SILICON DENDRITIC WEB RIBBONS

JET PROPULSION LABORATORY

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* Etch Pit Distribution

* Cross-Section EBIC

* Thermal Annealing Effect on Carrier Lifetime
Patterns of Etch Pits on Web Ribbon Surface
Due to Dislocations
Possible Movement of Three Major Slip Planes Under Stress

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ADVANCED SILICON SHEET

B B A A

(iii)

(ii1)

(iii)

(iii)

(iii)

(iii)

(iii)

(iii)

DE

BRI

TE

H.

I[1]

m 100 microns

- INTERCEPTS OF (iii) AND (ii1) TWIN BOUNDARIES WITH THE RIBBON SURFACE

- ETCH PIT LINES DUE TO SLIP DISLOCATIONS [101]

- INTERCEPTS OF (iii) AND (ii1) TWIN BOUNDARIES WITH THE TWIN PLANE

- THE TWIN PLANE IN THE CENTER OF THE RIBBON PARALLEL TO THE SURFACE
TOTAL STRESS ON THE FIRST DISLOCATION DUE TO THE PRESENCE OF NEIGHBORING DISLOCATIONS ALIGNING ALONG x DIRECTION

\[ \sigma_{xy}^{\text{tot}} = \frac{\mu b}{2\pi(1-\gamma)} \sum \frac{1}{x} \]

EXPERIMENTAL DATA

\[ \sigma_{xy}^{\text{tot}} \text{ (AT THE PILEUP)} = 1.07 \times 10^8 \text{ dynes/cm}^2 \text{ (1.55 \times 10}^3 \text{ PSI)} \]

USING \( Y = 20 \text{ PSI} \)

\[ \mu = \frac{Y}{2(1-\gamma)} = 9.57 \times 10^{11} \text{ dynes/cm}^2 \]
ADVANCED SILICON SHEET

Reciprocal of distance between two nearest etch pits (no. of etch pits/mm) vs. distance from ribbon edge (mm).
Cross-Section EBIC in As-Grown Web Ribbons (taken at room temperature)

Temperature Dependence of EBIC in Diffused Silicon Web Ribbon
SEM Picture of Etched Cross-Section of Silicon Web Ribbon

DENUDED ZONE

SURFACE

ORIGINAL PAGE IS OF POOR QUALITY
Effect of Diffusion

DIFFUSED

TWIN PLANE

TWIN PLANE

As-GROWN

EBIC

X

0

535