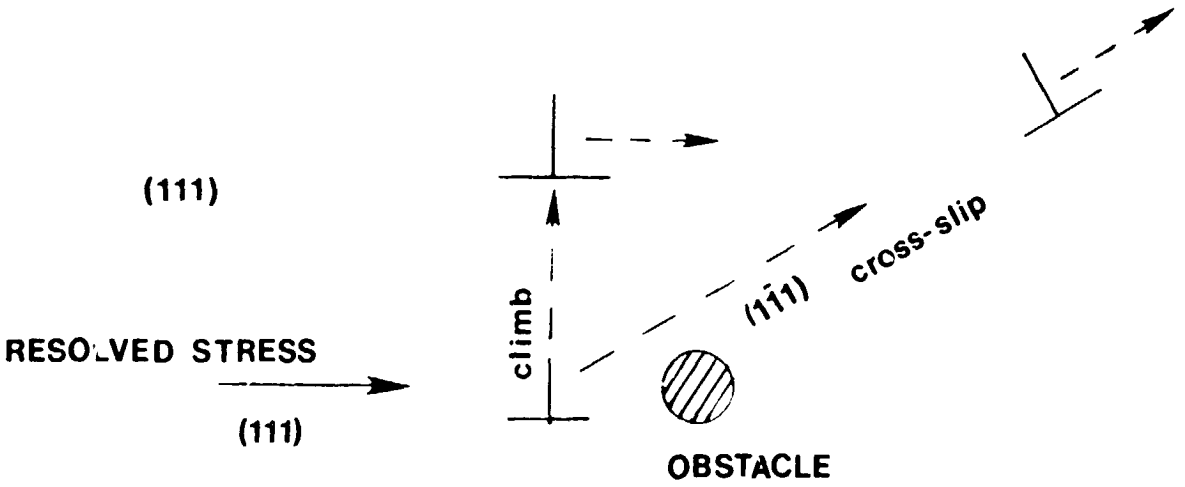
ELECTRICAL, STRUCTURAL, AND CHEMICAL CHARACTERIZATION OF SILICON SHEET MATERIALS

CORNELL UNIVERSITY

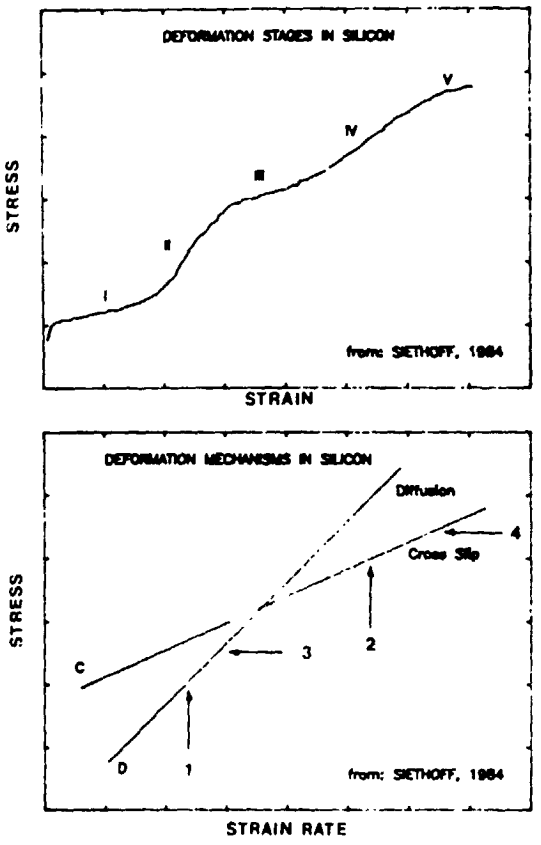
D. G. Ast
S. L. Hyland

Study of Stress in Web Silicon Ribbons Using High-Temperature Creep Experiments

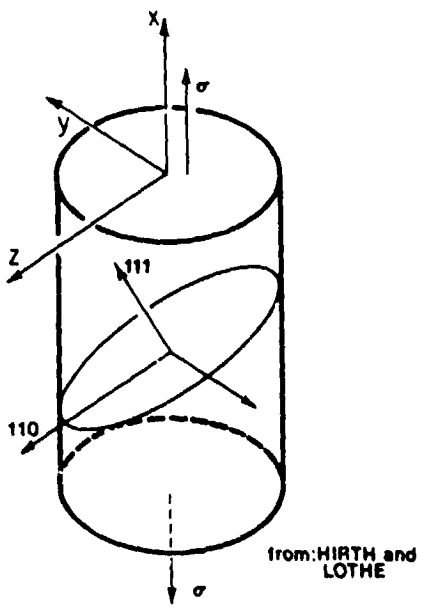
Dislocation Motion Around an Obstacle



Deformation in Silicon



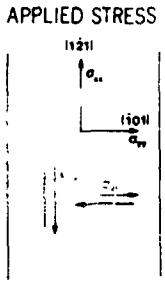
Resolving Applied Stress on a Dislocation

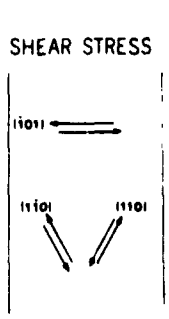


Calculation of Slip Systems

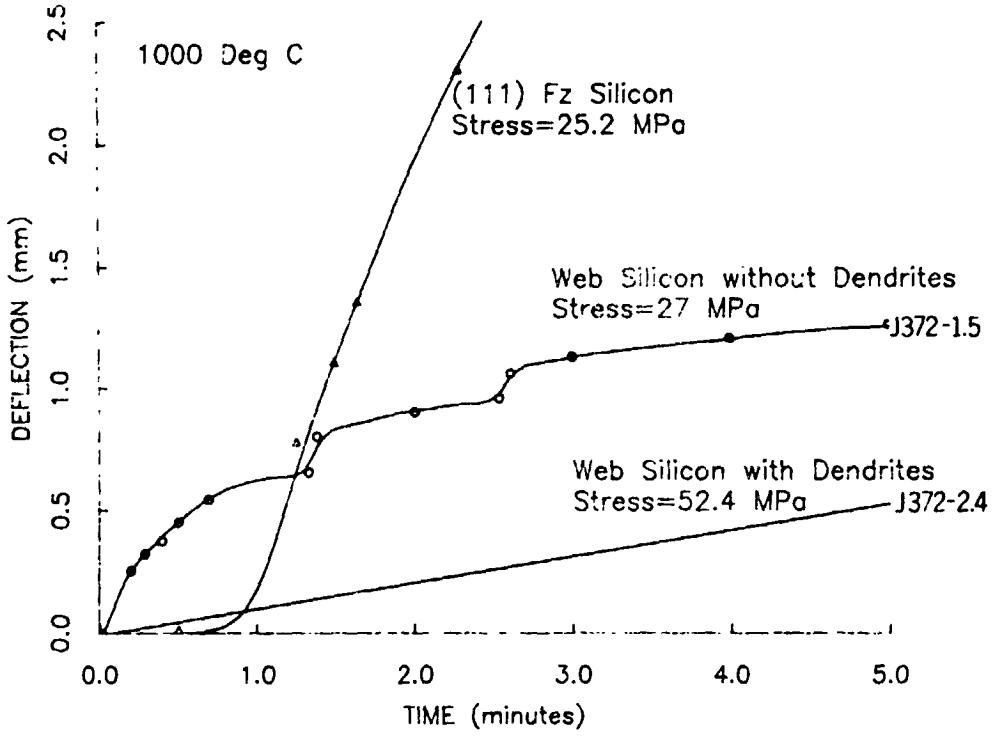
STRESS	ACTING ON PLANE	DIRECTION	SCHMIDT FACTOR
σ_{xx}	$\bar{1}1\bar{1}$	$10\bar{1}$	0
$1\bar{2}1$		011	0.2722
		110	0.2722
	$1\bar{1}\bar{1}$	110	-0.1361
		$0\bar{1}1$	0.4082 *
		101	0.2722
	$\bar{1}11$	$\bar{1}10$	0.4082 *
		011	-0.1361
		101	0.2722
	111	$\bar{1}01$	0
		$1\bar{1}0$	0
		$0\bar{1}1$	0
σ_{yy}			
$\bar{1}01$	$1\bar{1}\bar{1}$	$0\bar{1}1$	-0.4082
	$\bar{1}11$	$1\bar{1}0$	-0.4082
σ_{xy} or σ_{yx}	$\bar{1}1\bar{1}$	$10\bar{1}$	0.9428

Resultant Stresses

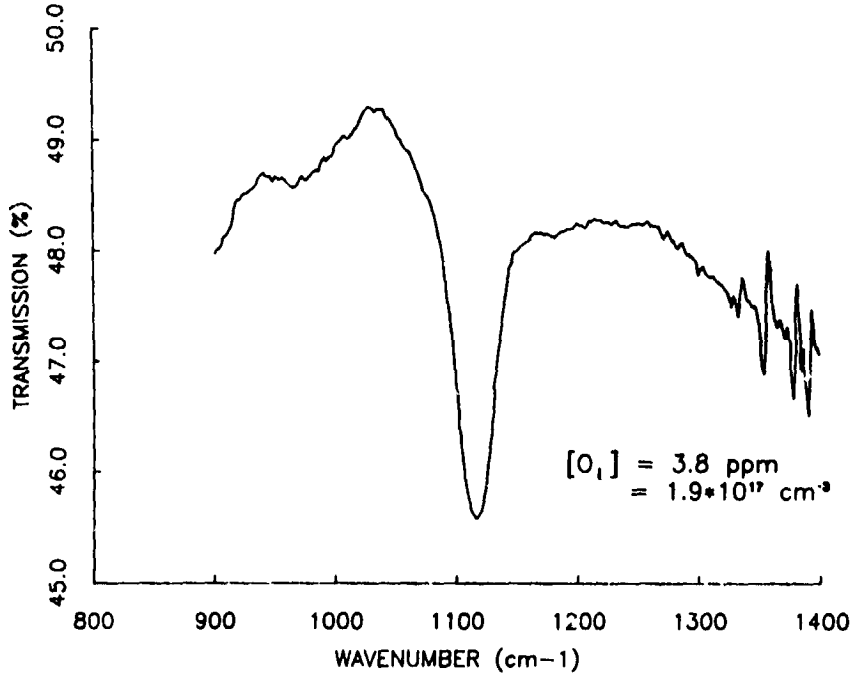




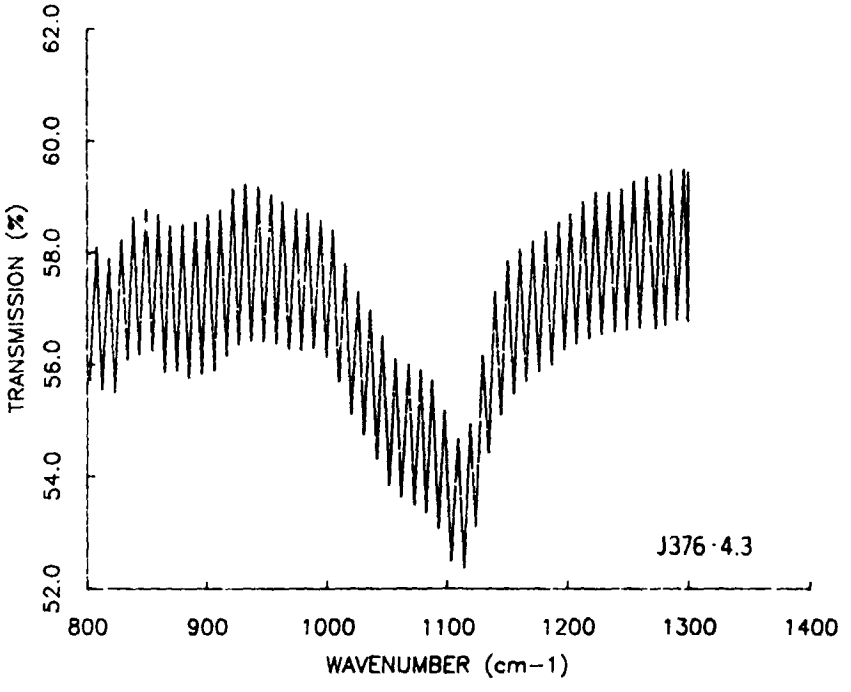
Deflection Versus Time for Four-Point Bending



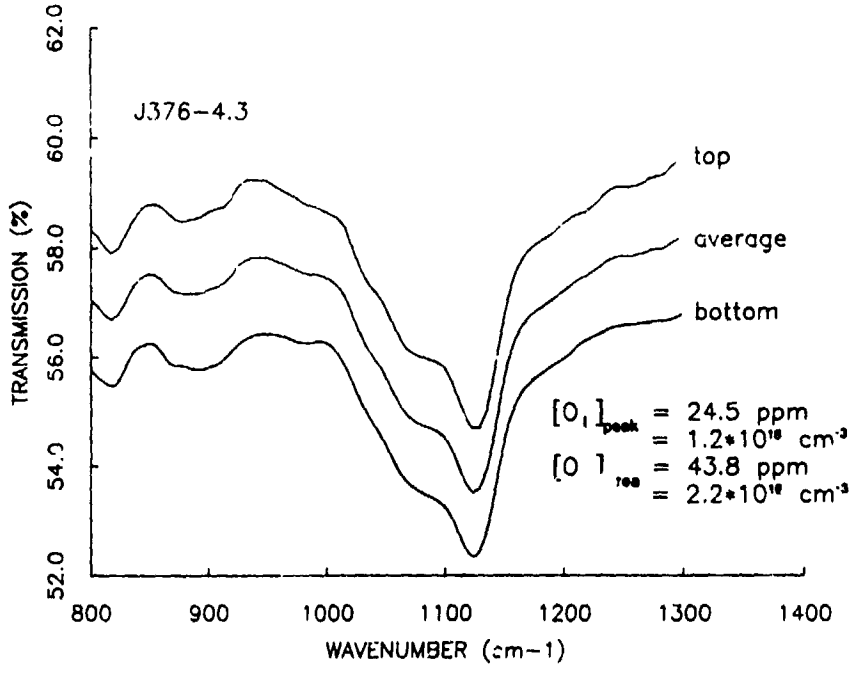
IR Transmission Versus Wavenumber for Czochralski Silicon



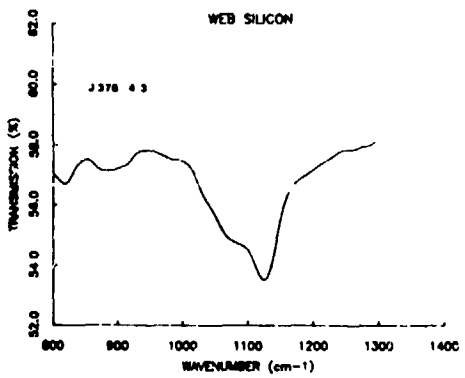
IR Transmission Versus Wavenumber for Web Silicon

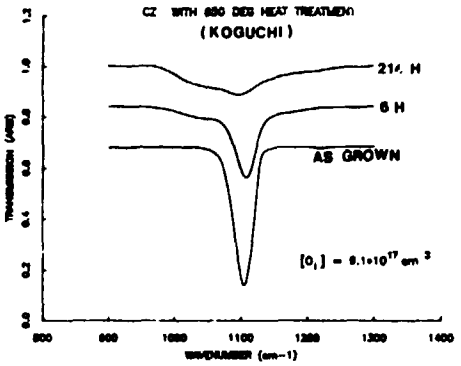


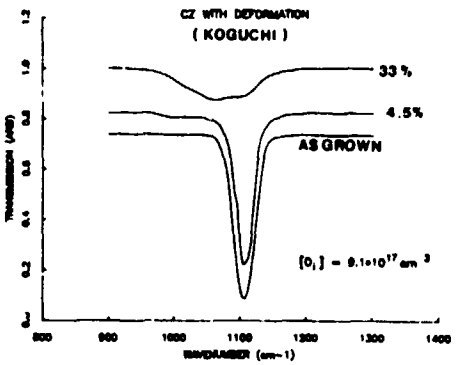
IR Transmission Versus Wavenumber for Web Silicon



IR Transmission Versus Wavenumber







Conclusions

Creep behavior of Web is very different from any seen for single crystal silicon.

Perhaps modeled between single crystal and polycrystalline

Perhaps related to st. . in the .ibbon.

Oxygen level in Web silicon is near the saturation level at the melting point of silicon.

Interstitial oxygen is only about 1/2 the total oxygen content.

The rest of the oxygen is in a state close to that of interstitial oxygen that is affected by its environment.