

Irrad 2011

Measurement set up

- **General**
 - ◆ $t = -20^{\circ}\text{C}^*$
- **IV**
 - ◆ from 0 to -1000V to BACK, PAD and INNERMOST GR at GND
- **CV**
 - ◆ same setup as IV plus:
 - ◆ $dV = 0.5\text{ V}$
 - ◆ $\nu = 1000\text{ Hz}$

Not a Bene

- In CV measurements the GR is really at GND while the PAD is at $R \times I_{\text{leak}}$, where $R = 40\text{ k}\Omega$

Analysis guide

1. No depletion up to 1000V for fluence larger than $1\text{e}15$
2. Two different slopes in CV plots for fluence greater than $1\text{e}15$; other levels
3. Corrections_for_Vdep_based_on_logC_logV.txt: Corrections for the depletion voltage due to temperature and frequency

Link to spreadsheet [↗](#)

Data

- **IV**
 - ◆ The first column is bias, the second is total current, the third is PAD current
- **CV**
 - ◆ The first column is the real voltage difference between BACK and PAD; 4th column is the bias set on the Keithley; 2nd column is capacitance; 3rd Conductivity; last column is total current

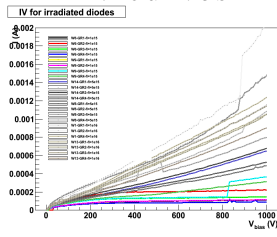
fluence (neq/cm ²)	file name	
1e15	1571-W6-DL1/1571-W6-DL1_2011-10-11_1.cv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL1/1571-W6-DL1_2011-10-11_1.iv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL2/1571-W6-DL2_2011-10-10_1.cv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL2/1571-W6-DL2_2011-10-10_1.iv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL2/1571-W6-DL2_2011-10-10_2.iv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL3/1571-W6-DL3_2011-10-10_1.cv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL3/1571-W6-DL3_2011-10-10_1.iv	http://dl.dropbox.com/u/82
1e15	1571-W6-DL4/1571-W6-DL4_2011-10-10_1.cv	http://dl.dropbox.com/u/82

1e15	1571-W6-DL4/1571-W6-DL4_2011-10-10_1.i.v	http://dl.dropbox.com/u/82
1e15	1571-W6-DL4/1571-W6-DL4_2011-10-10_2.c.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL1/1571-W9-DL1_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL1/1571-W9-DL1_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL2/1571-W9-DL2_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL2/1571-W9-DL2_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL3/1571-W9-DL3_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL3/1571-W9-DL3_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL4/1571-W9-DL4_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
1e15	1571-W9-DL4/1571-W9-DL4_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL1/1572-W4-DL1_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL1/1572-W4-DL1_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL2/1572-W4-DL2_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL2/1572-W4-DL2_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL3/1572-W4-DL3_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL3/1572-W4-DL3_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL4/1572-W4-DL4_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W4-DL4/1572-W4-DL4_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL1/1572-W8-DL1_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL1/1572-W8-DL1_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL1/1572-W8-DL1_2011-10-11_2.i.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL2/1572-W8-DL2_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL2/1572-W8-DL2_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL3/1572-W8-DL3_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL3/1572-W8-DL3_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL4/1572-W8-DL4_2011-10-11_1.c.v	http://dl.dropbox.com/u/82
5e15	1572-W8-DL4/1572-W8-DL4_2011-10-11_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL1/1573-W-DL1_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL1/1573-W-DL1_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL2/1573-W-DL2_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL2/1573-W-DL2_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL3/1573-W-DL3_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL3/1573-W-DL3_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL4/1573-W-DL4_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W-DL4/1573-W-DL4_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL1/1573-W3-DL1_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL1/1573-W3-DL1_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL2/1573-W3-DL2_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL2/1573-W3-DL2_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL3/1573-W3-DL3_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL3/1573-W3-DL3_2011-10-12_1.i.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL4/1573-W3-DL4_2011-10-12_1.c.v	http://dl.dropbox.com/u/82
1e16	1573-W3-DL4/1573-W3-DL4_2011-10-12_1.i.v	http://dl.dropbox.com/u/82

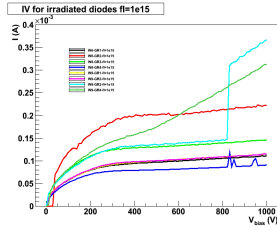
Results

IV

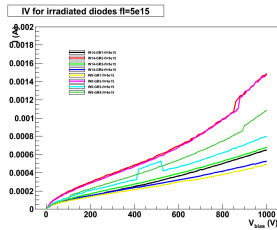
- All IV curves in one plot:



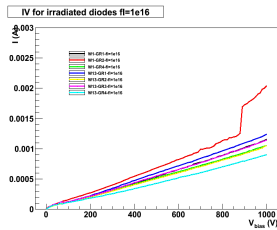
- IV curves for fluence = 1e15:



- IV curves for fluence = 5e15:

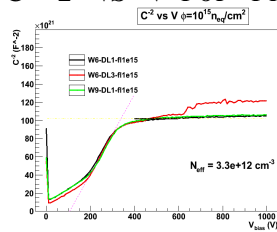


- IV curves for fluence = 1e16:

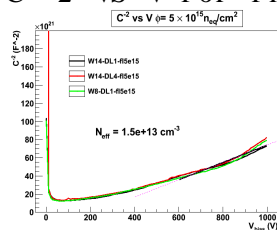


CV

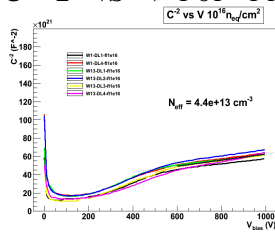
- C^{-2} VS V for $f1=1e15$:



- C^{-2} VS V for $f1=5e15$:



- C^{-2} VS V for $f_1=1e16$:



$$d=300 \text{ um} = 0.3 \text{ cm}$$

$$\begin{array}{l} \phi = 0 \\ n_{eq} / \text{cm}^2 \end{array}$$

W#	Neff (cm ⁻³)
W7	5.7e11
W9	5.5e11

$$V_{dep} = 38 \text{ V}$$

$$\begin{array}{l} \phi = \\ 10e15 \\ n_{eq} / \text{cm}^2 \end{array}$$

W#	Neff (cm ⁻³)
W6	3.3e12
W9	3.3e12

$$N_{eff}(\phi) = N_{eff}(0) - b \cdot \phi$$

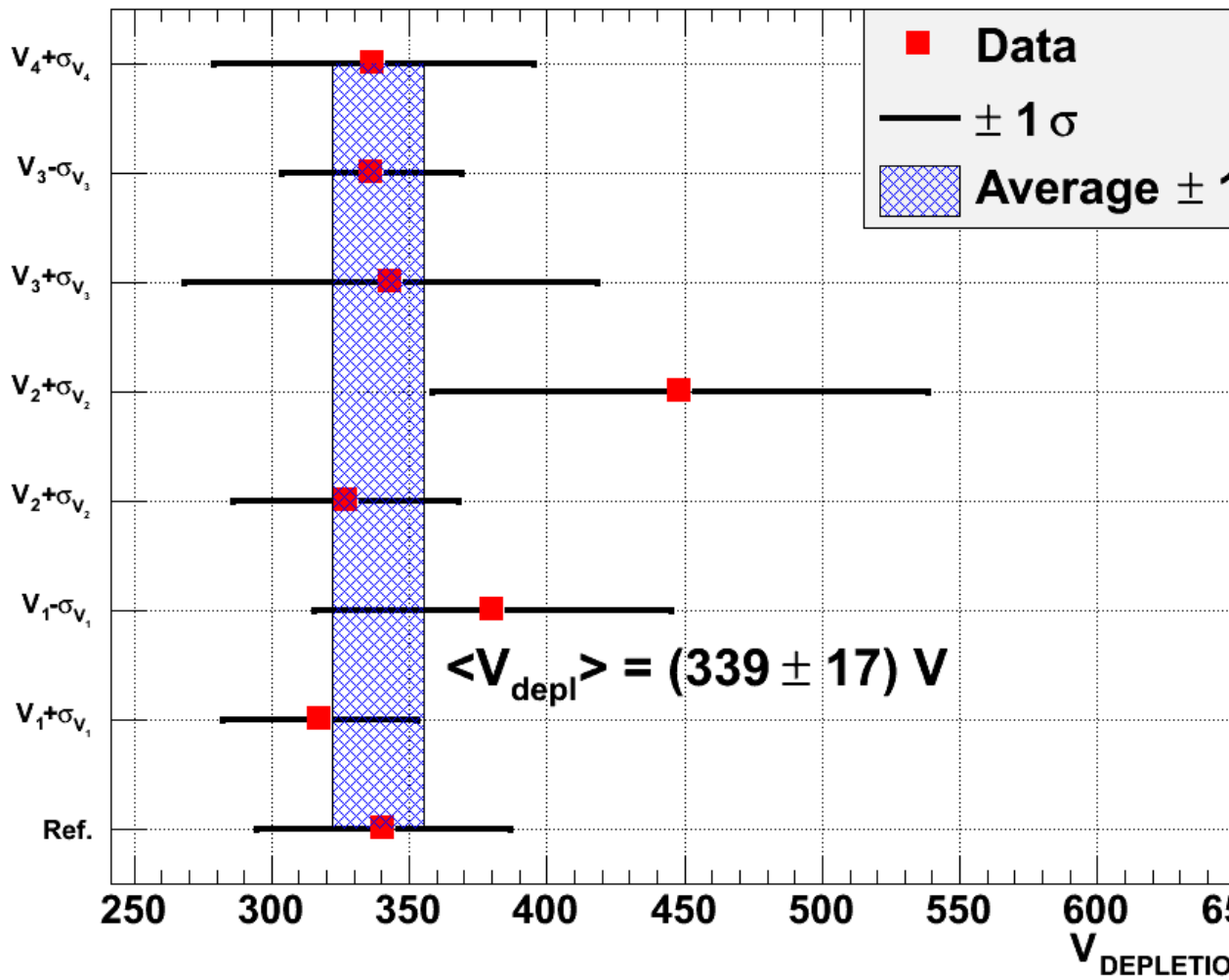
$$b = (N_{eff}(\phi) - N_{eff}(0)) / \phi = 3e-3 \text{ cm}^{-1}$$

$$V_{dep} = 230 \text{ V}$$

$$* \alpha = (6.9 \pm 1.5) 1e-17 \text{ A/cm}^2$$

- Plot of depletion voltage:

Real data



phi =
 5×10^{15}
 neq/cm²

W#	Neff (cm ⁻³)
W4	1.5×10^{13}
W8	1.5×10^{13}

$N_{\text{eff}}(\phi) = N_{\text{eff}}(0) - b \cdot \phi$

$b = (N_{\text{eff}}(\phi) - N_{\text{eff}}(0)) / \phi = 3 \times 10^{-3} \text{ cm}^{-1}$

$V_{\text{dep}} = 1034 \text{ V}$

phi =
 1×10^{16}
 neq/cm²

W#	Neff (cm ⁻³)
W	4.4×10^{13}
W3	4.4×10^{13}

$N_{\text{eff}}(\phi) = N_{\text{eff}}(0) - b \cdot \phi$

$$b = (N_{eff}(\phi) - N_{eff}(0)) / \phi = 4e-3 \text{ cm}^{-1}$$

$$V_{dep} = 3034 \text{ V}$$

-- MarcoBomben - 11-Oct-2011

This topic: Main > Irrad2011

Topic revision: r12 - 2017-11-12 - MarcoBomben



Copyright © 2008-2019 by the contributing authors. All material on this collaboration platform is the property of the contributing authors.

Ideas, requests, problems regarding TWiki? Send feedback