

Generation of a Shallow Donor after 6, 15 and 900 MeV Electron Irradiation

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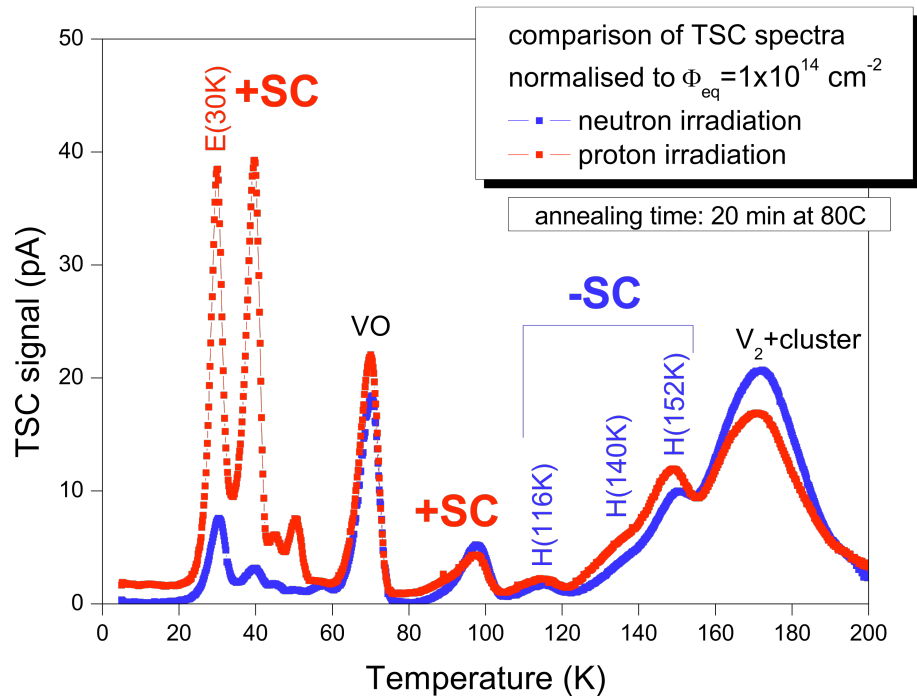
²NIMP, Bucharest-Margurele

15th RD50 Workshop
18.11.2009, CERN

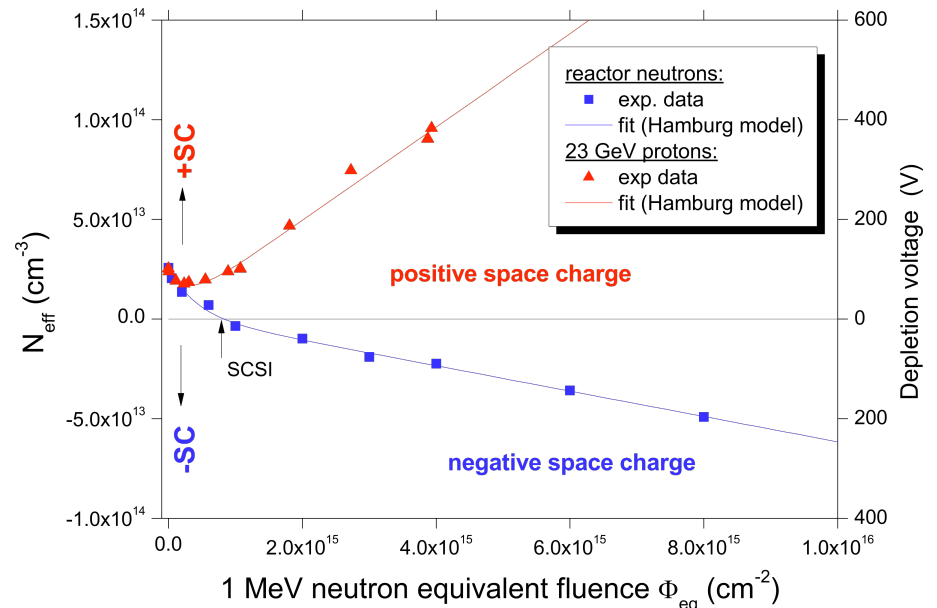


Motivation

TSC results

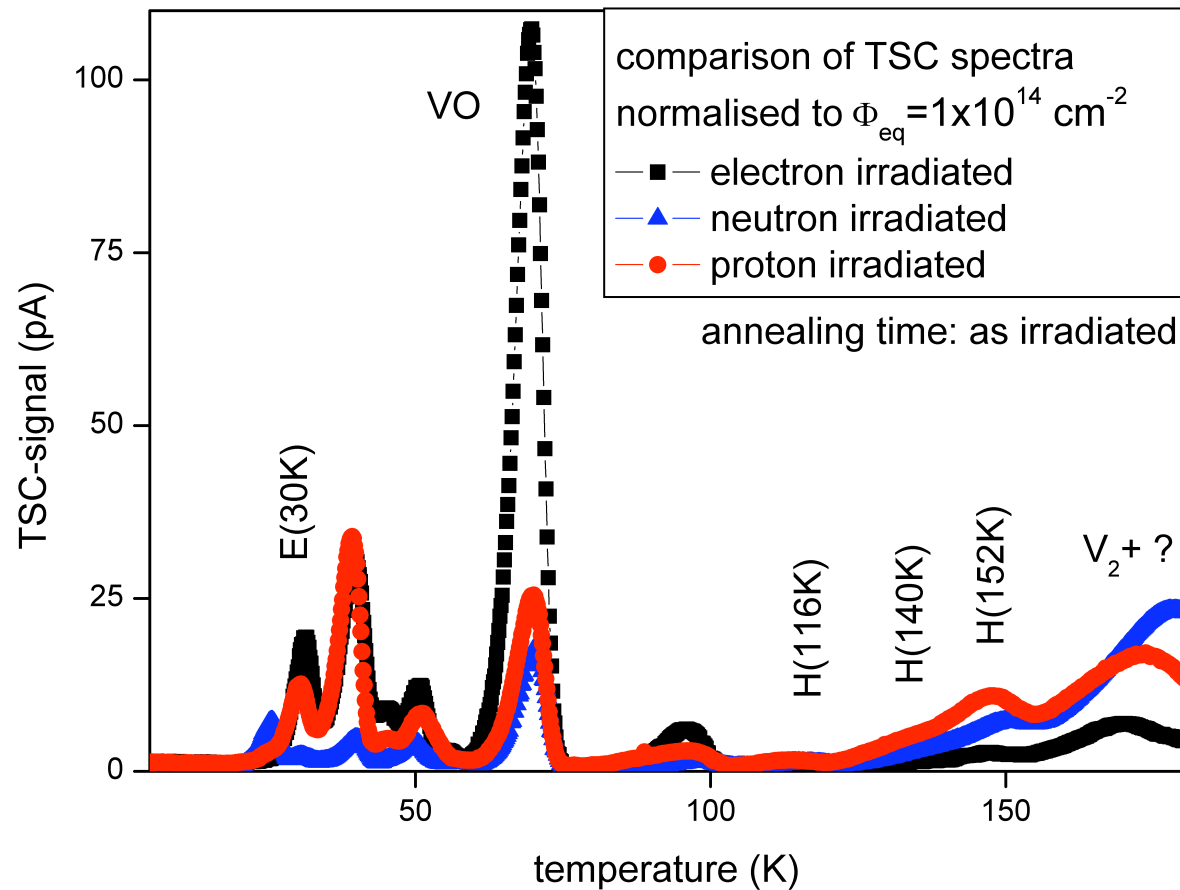


Results from CV



- Shallow donor E(30K) overcompensates deep acceptors
- Cluster defect E(30K) enhanced after protons

E(30K) after Electron Irradiation



Can electrons help to find clustersize?

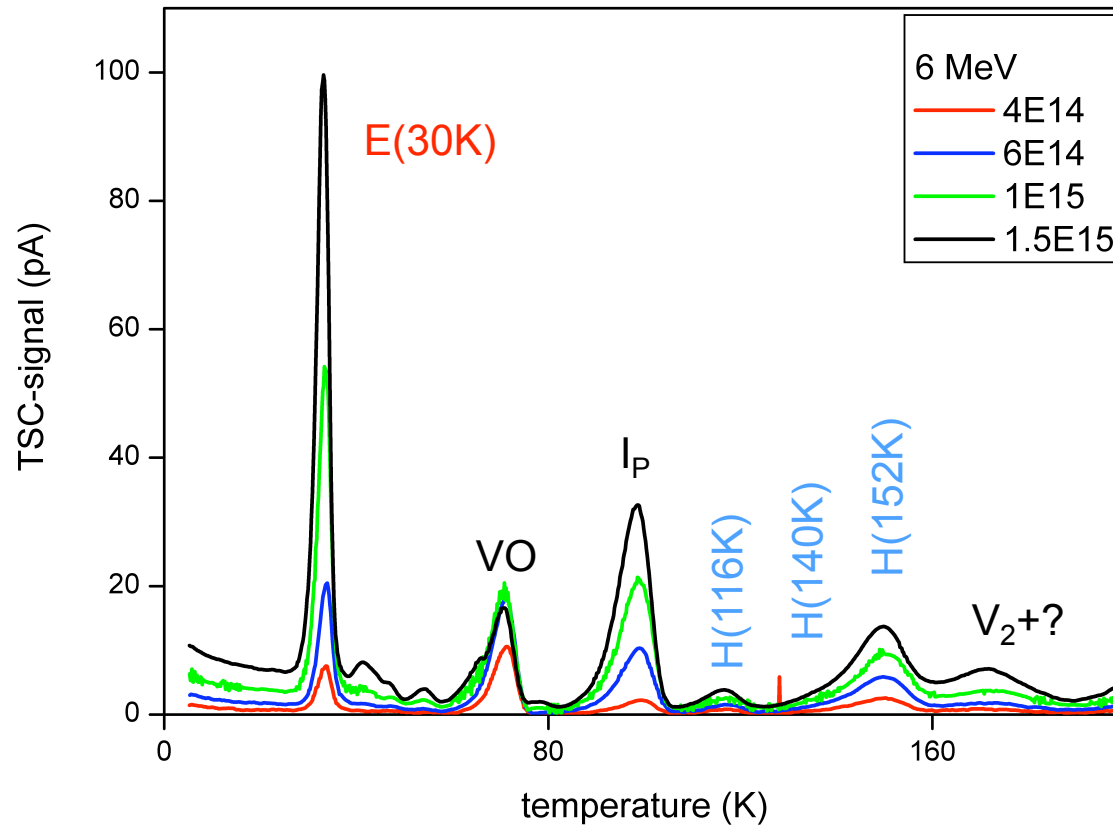
Material Overview

e ⁻ Energy (MeV)	Material	e ⁻ Fluence (cm ⁻²)	Storage
6	FZ	4 x 10 ¹⁴ 6 x 10 ¹⁴ 1 x 10 ¹⁵ 1.5 x 10 ¹⁵	5 years at -30 °C
15	FZ DOFZ	5 x 10 ¹⁴ 5 x 10 ¹⁴	5 years at RT 5 years at -30 °C
900	DOFZ FZ FZ + DOFZ	5 x 10 ¹⁴ 1 x 10 ¹⁵ 2 x 10 ¹⁵	5 years at -30 °C (at 240min@80 °C)

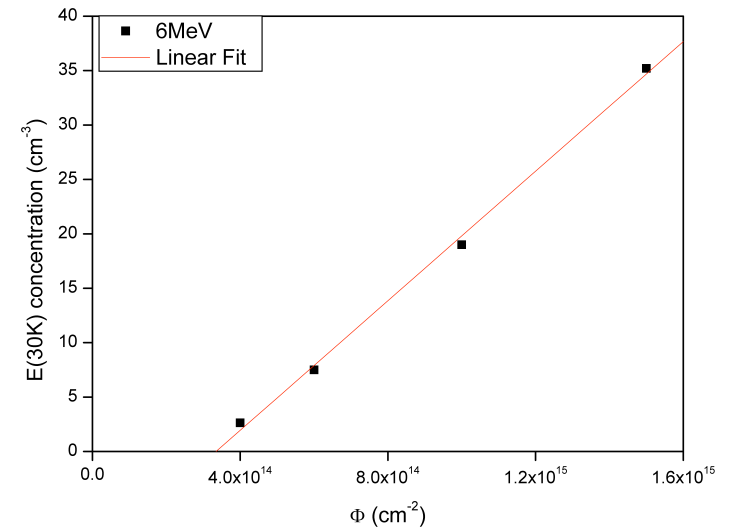
Problem with NIEL-normalisation!
(Devis Contarato, PhD Thesis 2005)

TSC on 6 MeV Irradiated FZ

Annealing step: 240min@80C



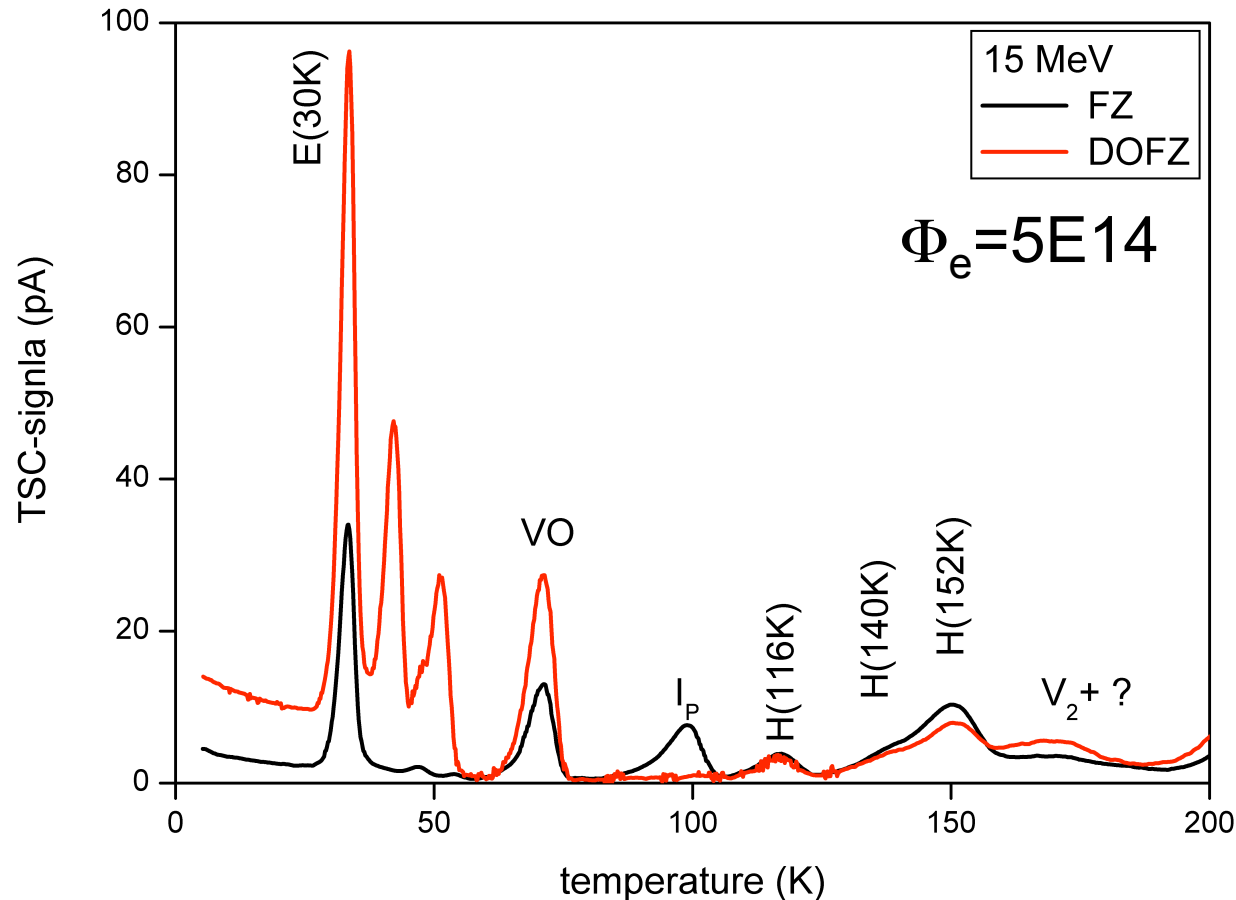
E(30K) concentrations



Results seem consistent, but fluence uncertainties

15 MeV FZ and DOFZ

Annealing step: 240min@80C

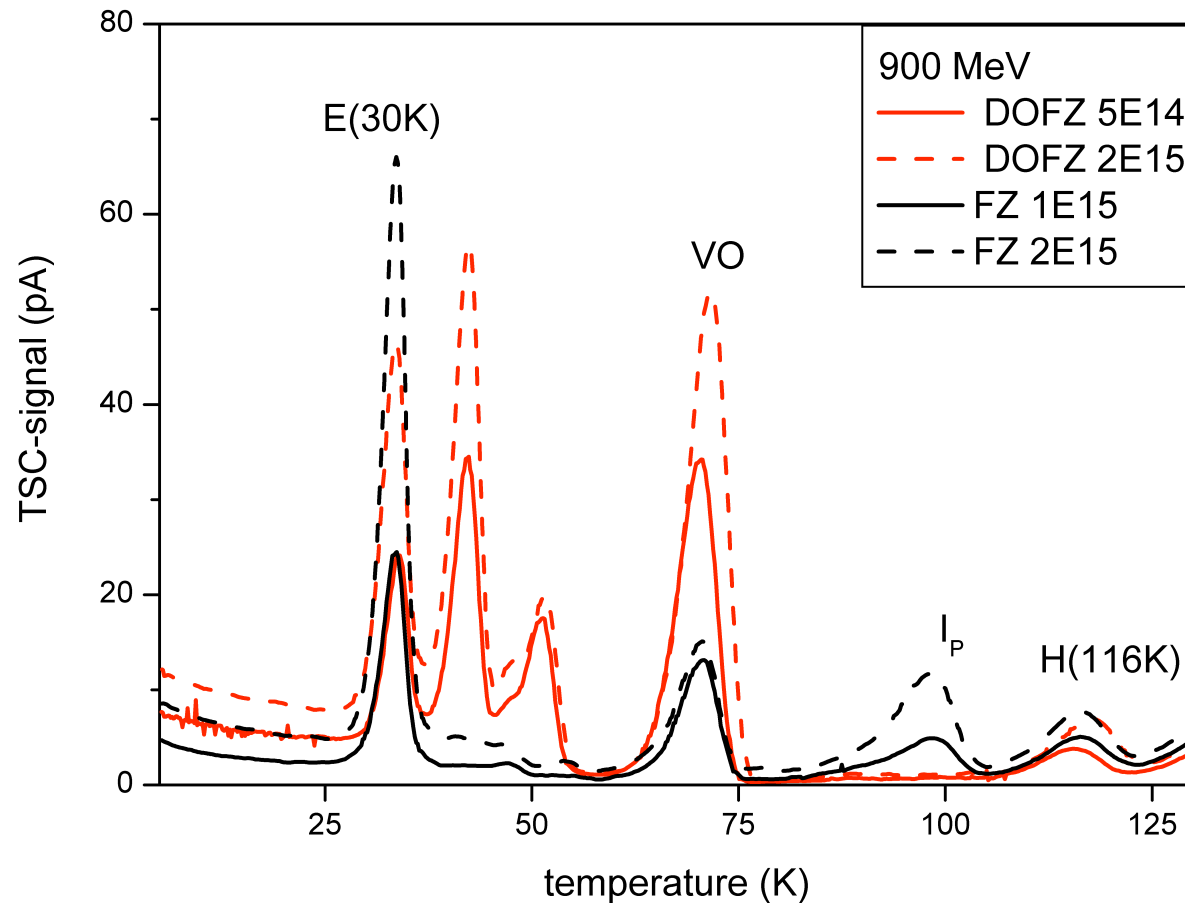


- I_p -defect suppressed in DOFZ
- E(30K) enhanced in DOFZ

Possible oxygen correlation for E(30K)?

900 MeV FZ and DOFZ

Annealing step: 240min@80C

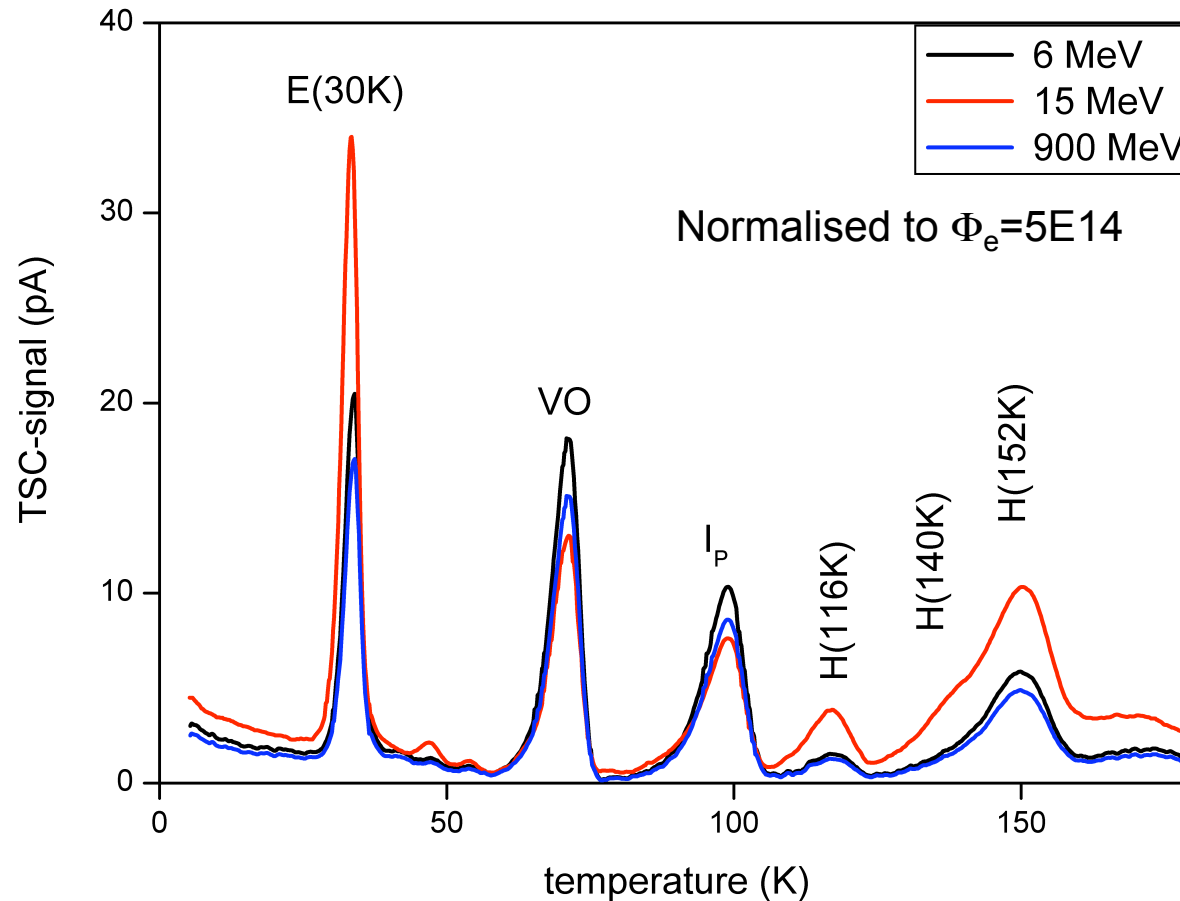


- I_P-defect suppressed in DOFZ

Generation of E(30K) not consistent with previous figure

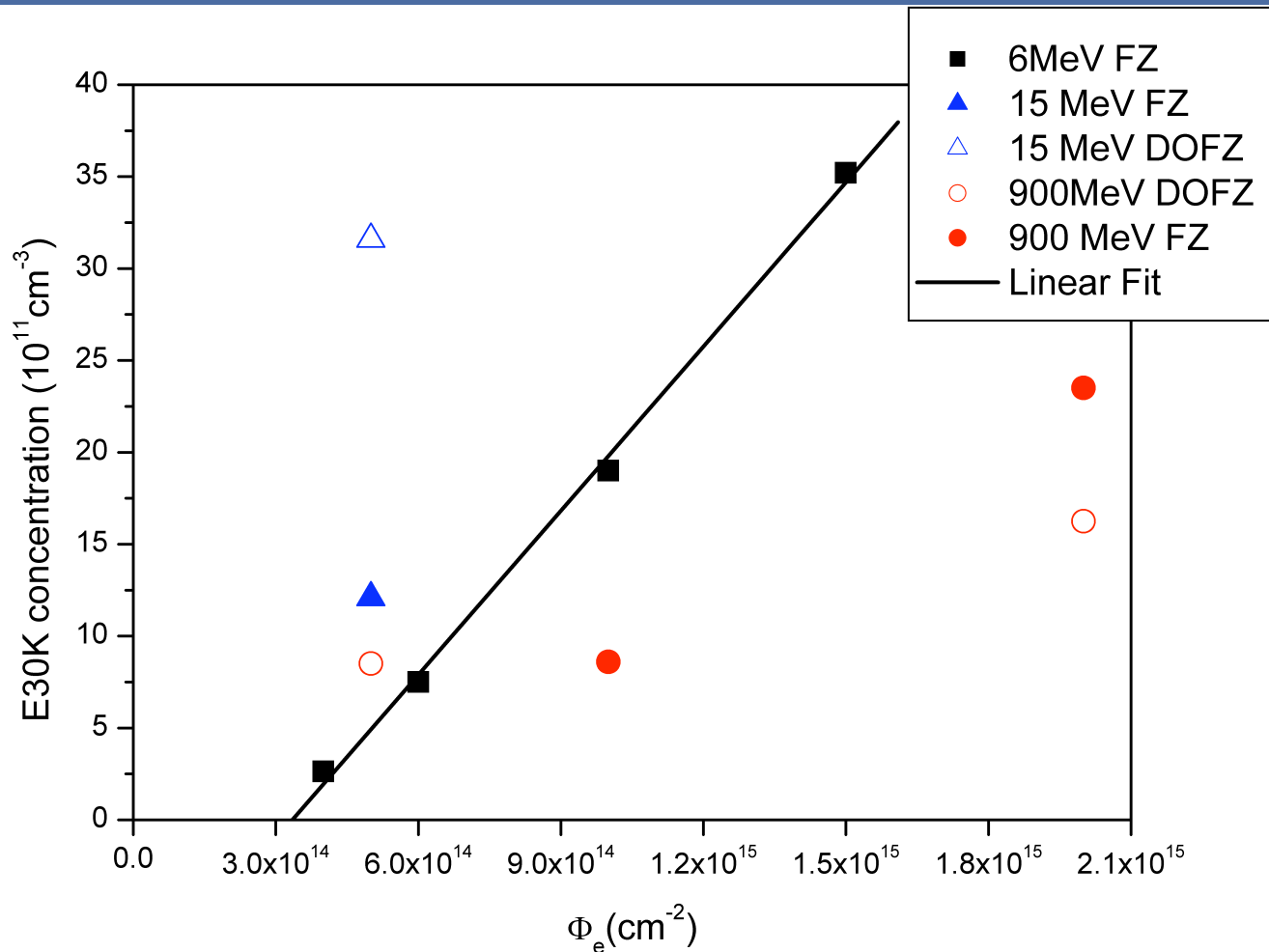
Comparison of FZ for 6, 15 and 900 MeV

Annealing step: 240min@80C



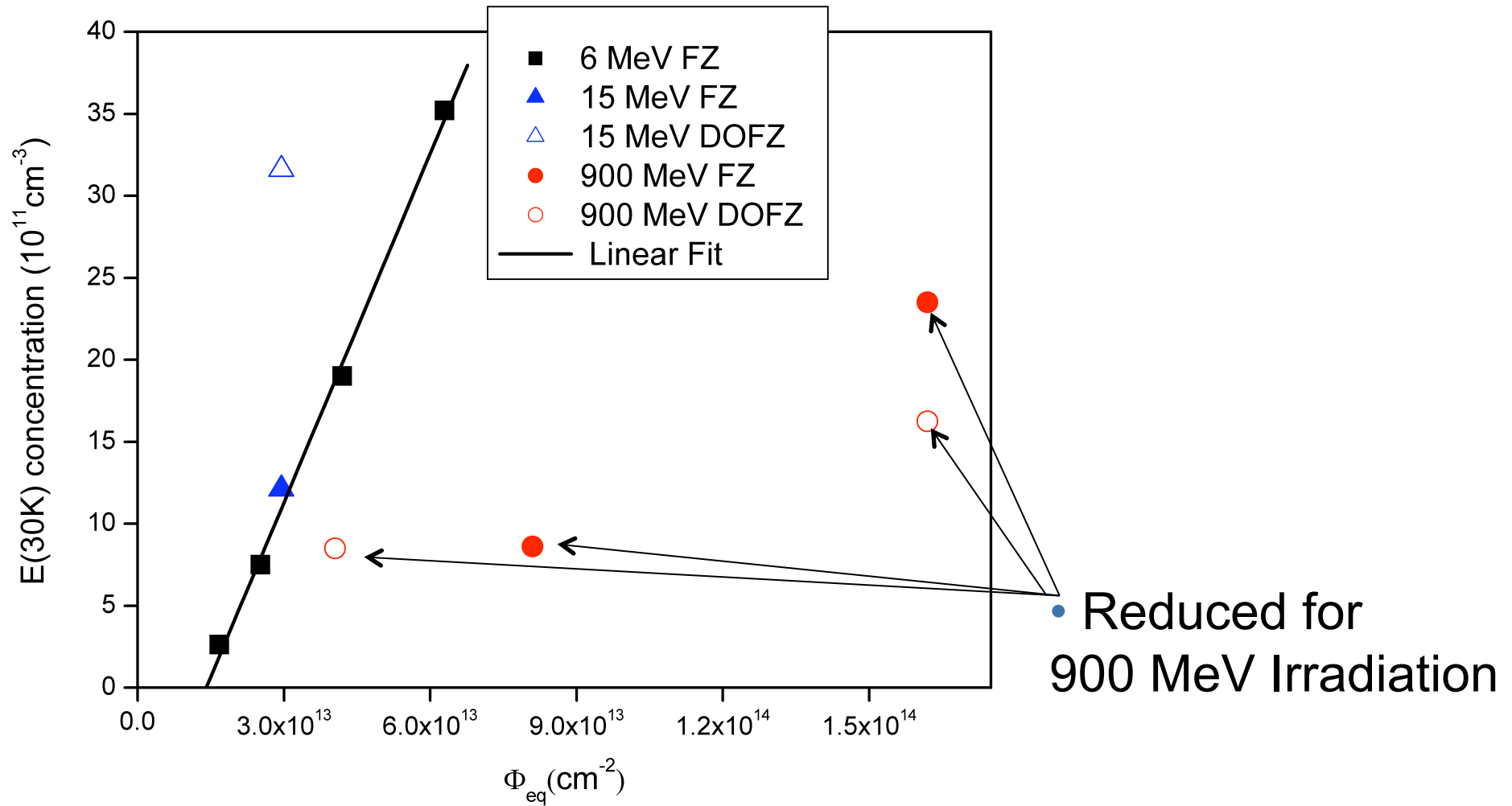
- E(30K) enhanced in 15 MeV
- Fluence?

E(30K) Results (Electron Fluences)

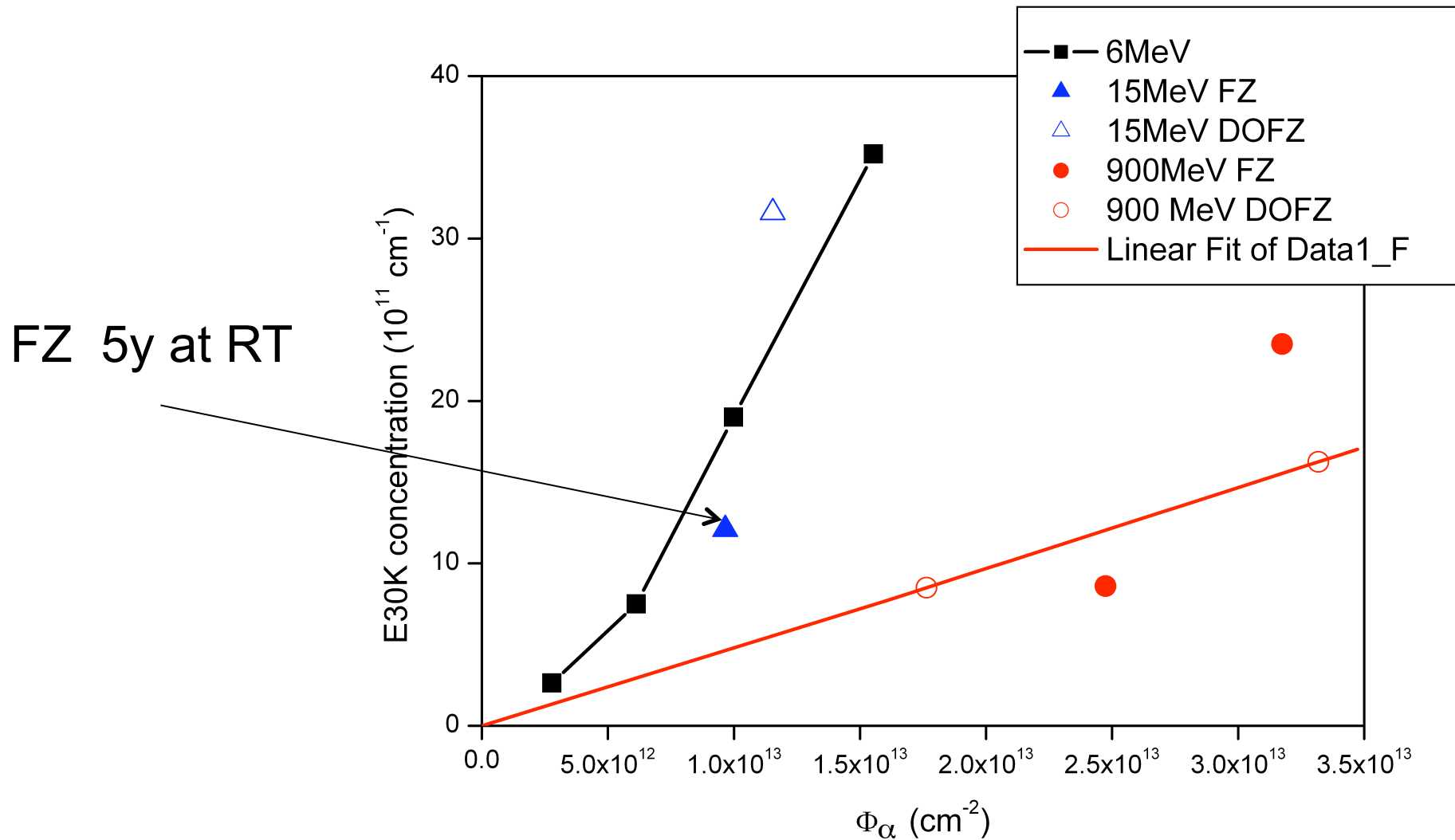


- E(30K) suppressed for 900 MeV e^- irradiation
- E(30K) enhanced after 15 MeV e^- irradiation

Niel Normalisation



Result Current Normalised



Summary

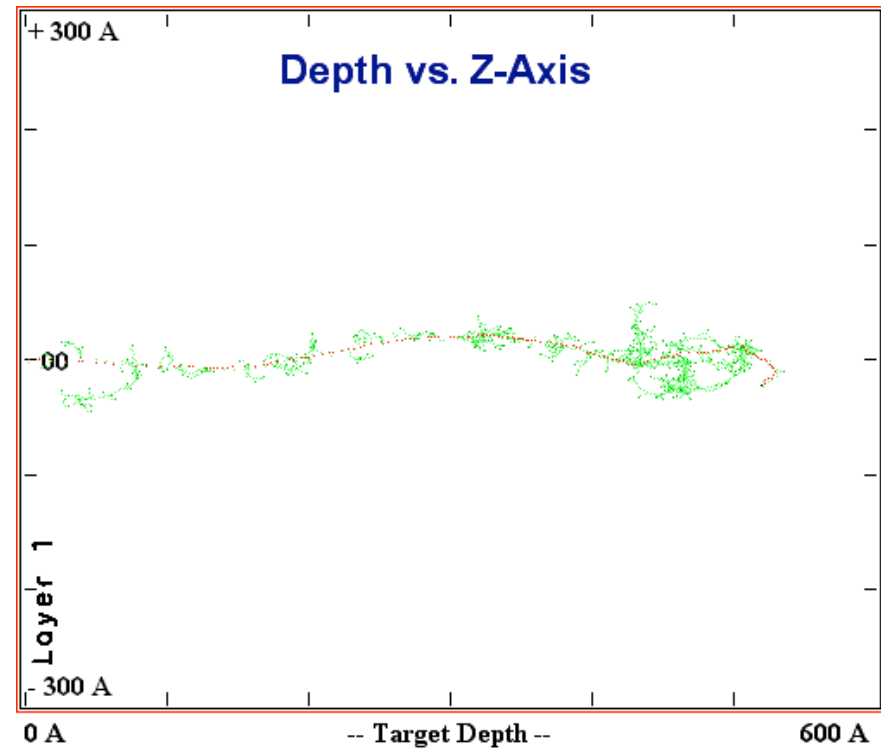
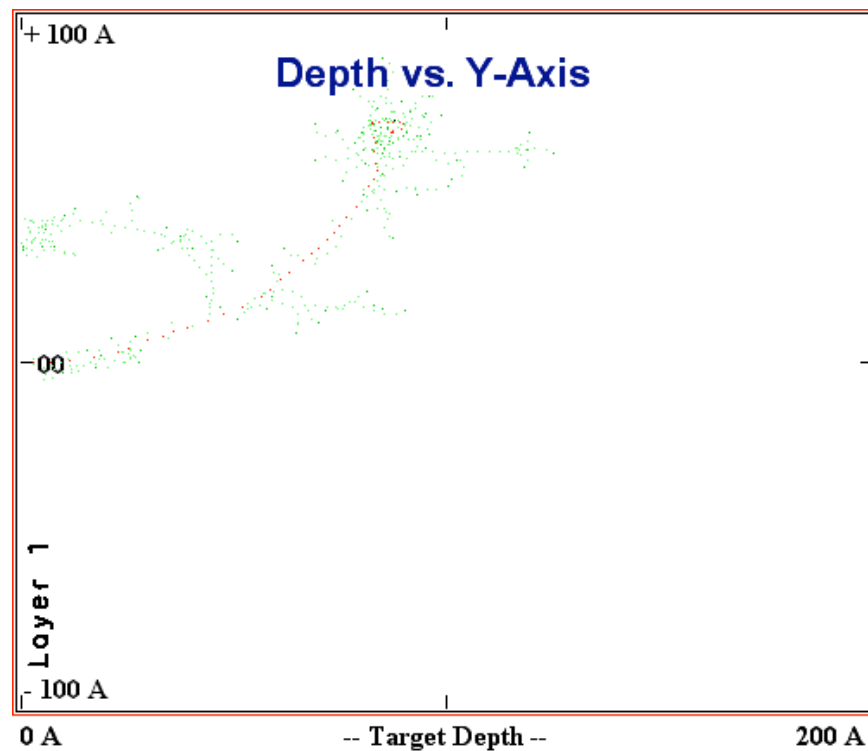
- E(30K) production enhanced for lower electron energies
- Possible oxygen correlation?
- Detailed simulations needed

Outlook (TRIM)

Vacancy production due to maximum recoil energy

6 MeV e^- ($E_R=3.2$ keV)

15 MeV e^- ($E_R=18.3$ keV)



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