HASPIDE
WP3 TCAD Simulations

22/06/2022

- ## WP3 Simulations – Status and plans

  - **Technology CAD (TCAD)** approach (**Sentaurus Synopsys TCAD**), to the analysis of a-Si:H

    - a-Si:H model within TCAD environment

      - defect modelling (bandgap engineering from Wollongong)

      - new carriers' mobility models

    - charge transport within a-Si:H material;

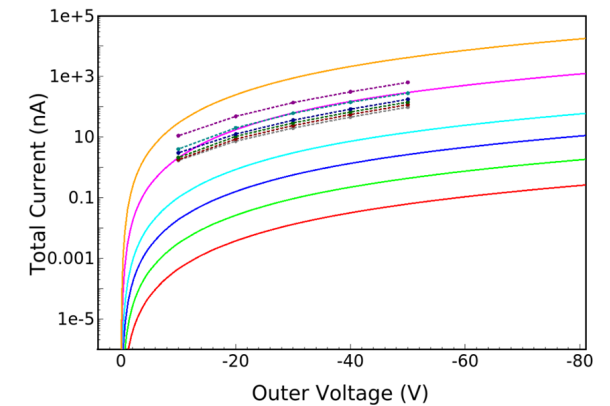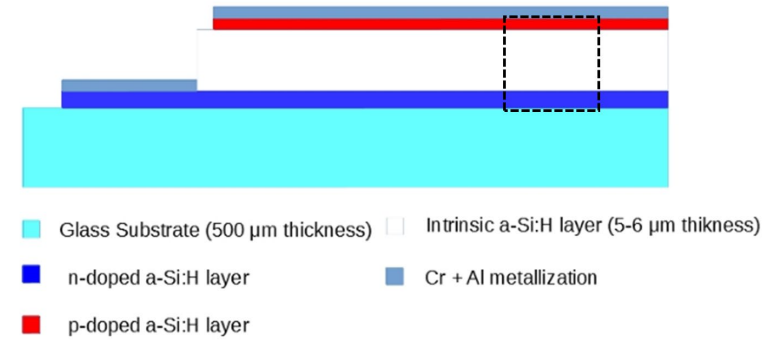   - device electrical response (DC, transient simulations).

A.D. 1308
unipg

- # WP3 Simulations – 2022 Q1 & Q2 Activity Report

  - **Set-up of the simulation environment**:
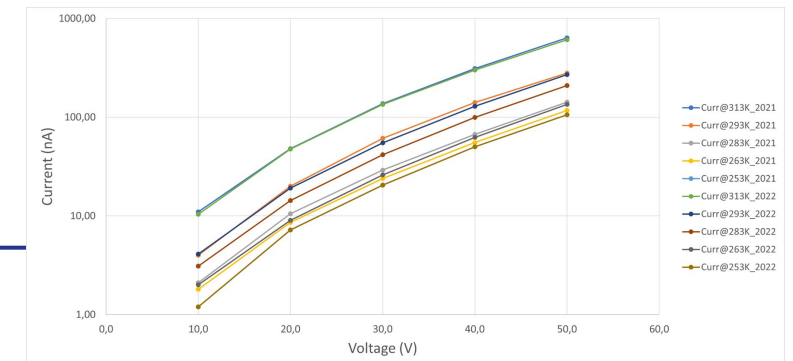   - different layout / geometrical / electrode configuration
    - mesh optimization

  - **Simulations @T and @V and comparison with measurements**

  - **New mobility models' definition (PMI)**
  - **Parameter / T dependence analysis**
  - **New measurements on available structures**

Glass Substrate (500 µm thickness)   Intrinsic a-Si:H layer (5-6 µm thikness)
n-doped a-Si:H layer   Cr + Al metallization
p-doped a-Si:H layer

$$\mu = A^* V^2 T^2 \, exp \left(b \frac{\sqrt{|F| + F_{\min}}}{T} \right)$$

- WP3 Simulations – 2022 Q3 & Q4 Activity Plan

  - μicroscopic and **M**acroscopic analyses:
    - $\Delta T \rightarrow \mu = \mu(T) \rightarrow I = I(T)$
  - **Different transport models (Thermodynamic, Hydrodynamic vs. DD)**
  - **Transient Analysis (MIP response)**
  - **Selective contact introduction**:

- # WP3 Simulations – Outcome

  - **Internal Presentations**

    - WP3 Simulation 2022.01.18

    - WP3 Simulation 2022.01.27

    - WP3 Simulation 2022.03.24

  - **Thesis (B.Sc.)**

    - D. Polzoni, "Hydrogenated amorphous silicon (a-Si:H) carriers mobility models in TCAD environment for particle detection design", Corso di Laurea Triennale in Ingegneria Informatica, Università degli Studi di Perugia

- # WP3 FTE & 2023 Requests

WP3 Requests

		Year 1	Year 2	Year 3
Software / Licenses	Synopsys Advanced TCAD Maintenance and Licenses	2 k€	2 k€	2 k€
Consumables		2 k€	2 k€	2 k€
Equipment	1 WorkStation (80 core, 256 GB RAM)	8 k€	3 k€	
Man Power	1Y AR	25 k€		

WP3 FTE

Unit	Name	FTE
PG	Daniele Passeri	0.2
	Francesco Moscatelli	0.1
	Arianna Morozzi	0.2