Silicon Diodes for Defect Spectroscopy

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Outline:

- A new sensor production at CiS
  - ....

Motivation

Defect spectroscopy needs different resistivity materials

- We are running out of previously produced p-type test structures
  - Interest: Need more EPI-test structures to complement previous studies
- We are missing low resistivity material for testing
  - Interest: n- and p-type dopants
  - Interest: high doping content; high electric field; fermi level close to bands

Why now?

- CiS is going to shut down the 4-inch production line
  - [January 2025 – last possible date for order]
- Mask set and wafers are available at CiS
 - re-use of mask set from last RD50 project on "mimicking LGAD"

Why not DRD3 common project?

- no time for DRD3 evaluation and approval process before placing order

Mask (4-inch)

Mask

- Existing mask set (project RD50-2022-01)
- Front side: Only diodes and test fields
- Back side: Full area implant and metal (cost saving)
- Same mask for n- and p-type (splitting of some process steps)
- Additional masks needed for this production
  - 3 masks need to be replaced (contaminated with carbon)
- Diodes 2.5 x 2.5 mm^2 and 1.25 x 1.25 mm^2
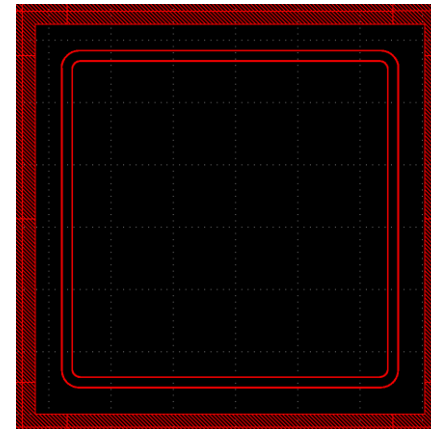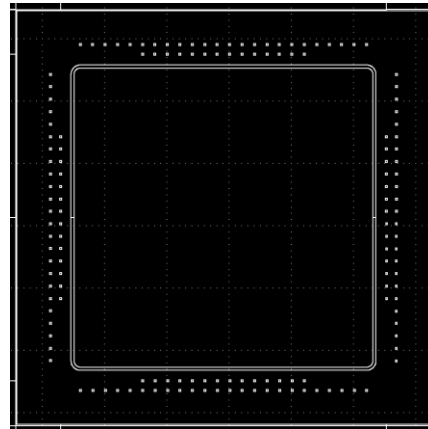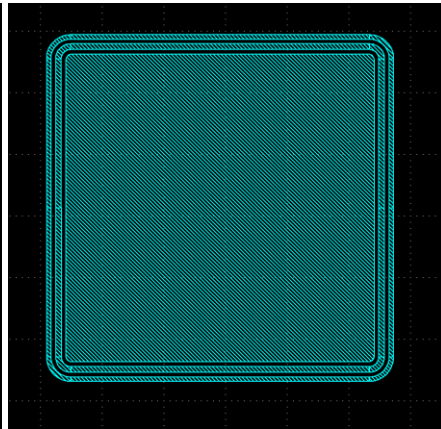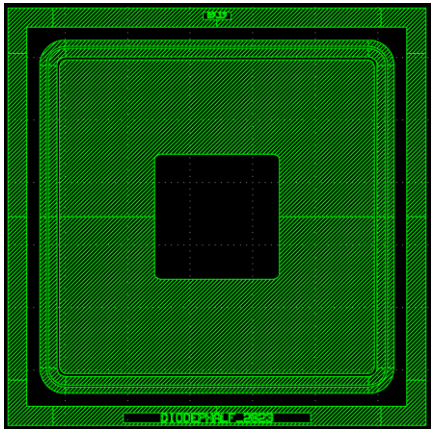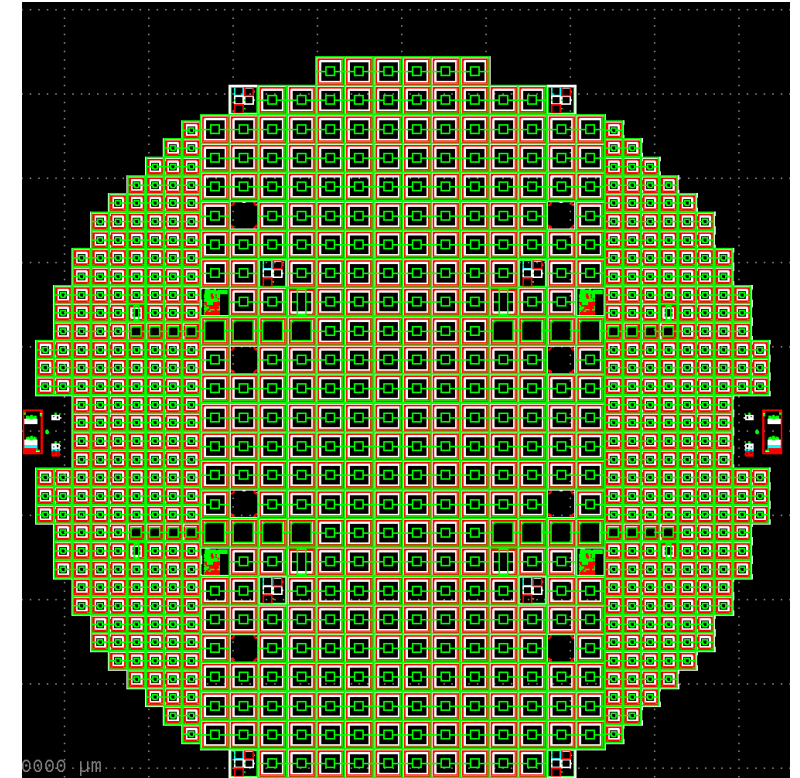
Material

- Limited to wafers in stock at CiS (due to time constraints)
- Material under discussion (n-type to be added)

Beschriftung	Bemerkung		Dotierung	Widerstand	Orientierung	Dicke	
W1		FZ	P	10000	100	525	
W2	401782_22-25	FZ	B	>3000	100	525	
W3	401782_01-12	FZ	B	100-200	100	350	2
W4	401782_16-18	CZ	B	8-12	100	525	2
W5		CZ	B	5-10	100	525	
W6		CZ	B	1-5	100	525	2
W7	CZ3, 402757_25	CZ	B	1-2	100	475	
W8	CZ2, 401782_13-15	CZ	B	0.5-1	100	250	1
W9	CZ1, 401782_19-21	CZ	B	0.224-0.26	100	525	1

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Wafers from run 350153:

4 wafers with 50µm EPI from ITME with 10Ohmcm
3 wafers with 50µm EPI from ITME with 50Ohmcm
3 wafers with 50µm EPI from ITME with 250Ohmcm
3 wafers with 50µm EPI from ITME with 1000Ohmcm

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Cost

- Estimated cost for production: 25 keuros
  - further cost: new mask layers, wafers