TÉCNICO
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PIC2

Gallium Oxide pn heterojunctions using RF-sputtering on p-type substrates

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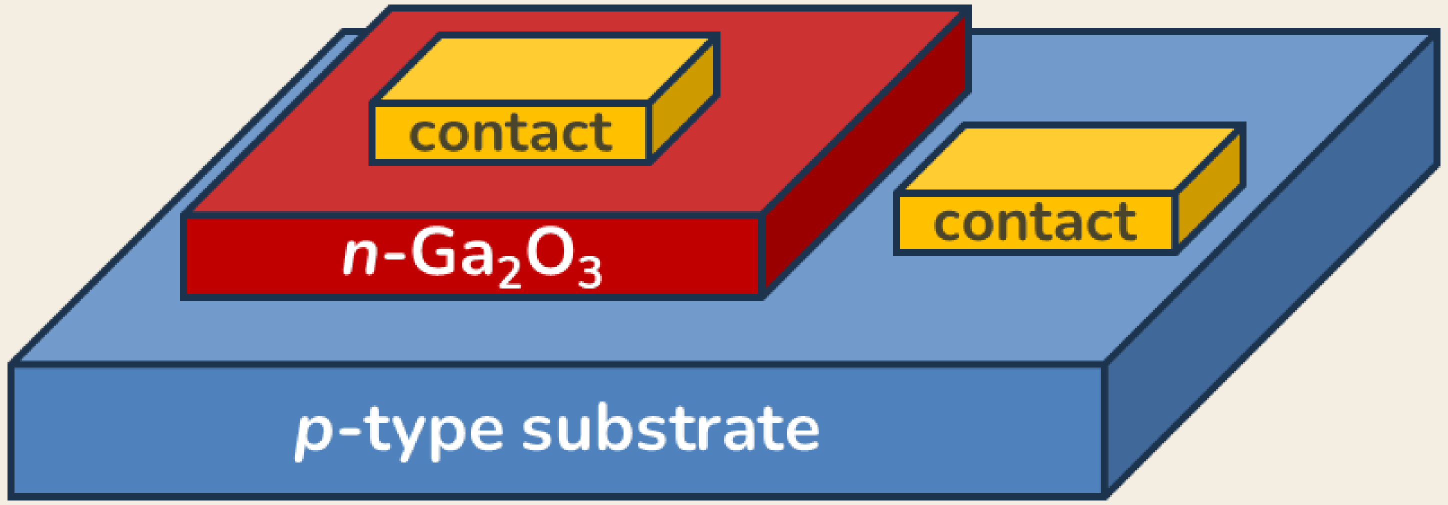
End Goal: develop + characterize a Ga_2O_3–based photodetector



Milestones:

1. Optimization of Ga_2O_3 deposition conditions
2. Optimization of contacts on p-type substrates and on Ga_2O_3 films
3. *pn*-Heterojunctions thermal annealing
4. Development and Characterization of Ga_2O_3–based photodetector devices

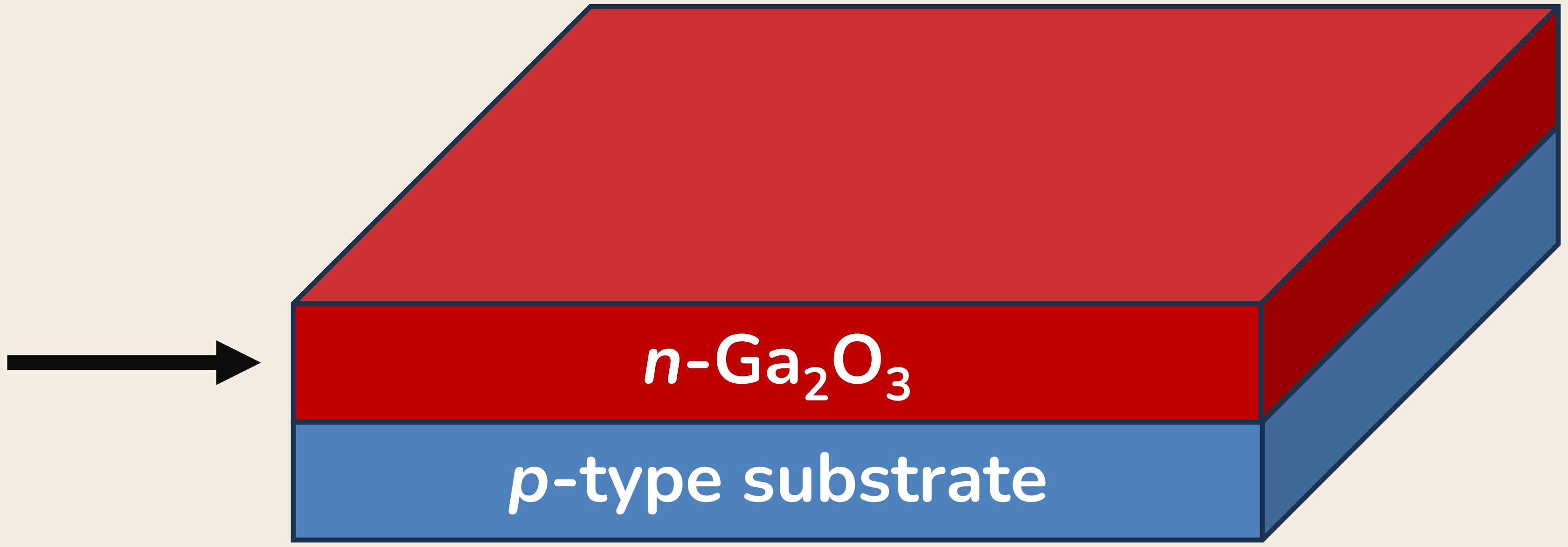
Preliminary Experiment

Substrates:

- p-GaN
- p-Si
- p-Diamond

Deposited using

RF sputtering



n-Ga_2O_3

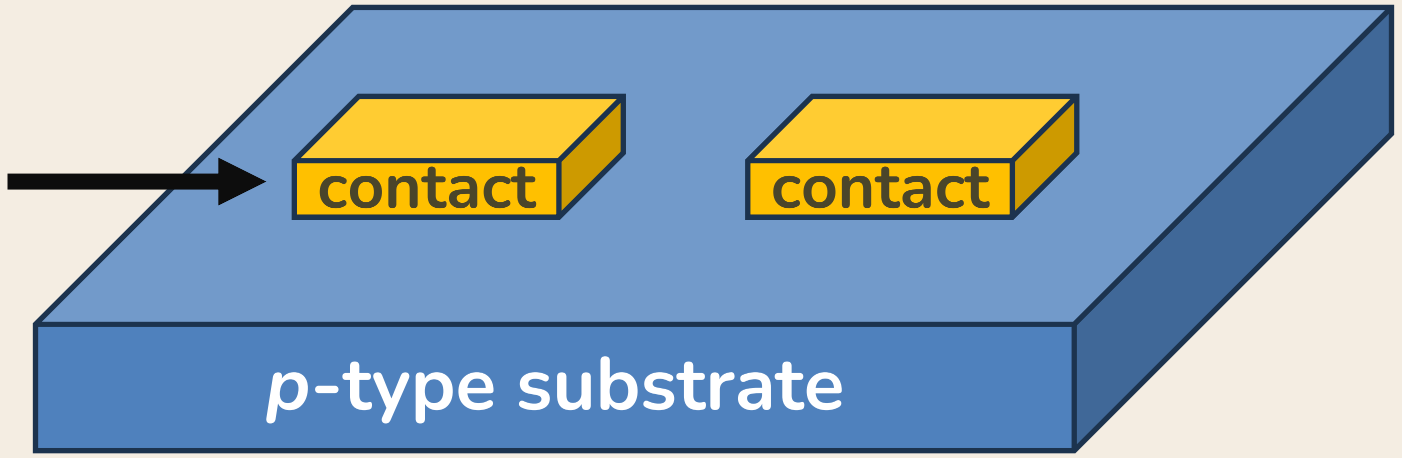
p-type substrate

Contacts:

- Ni/Au

Deposited using

DC sputtering



contact

contact

p-type substrate

Results and Future work

RBS (measures film stoichiometry and composition):

- Measured Ga:O film stoichiometry was close to the simulated one, except for p-diamond (rough substrate)

IV curve (measures contact resistance):

- Ohmic behavior on p-diamond
- Schottky behavior in p-GaN

Key takeaways for future work

- Find RBS simulation model for films on rough substrates
- Thermal annealing to obtain ohmic contacts
- Try other metal stacks for electrical contacts (e.g. Pt/AU)
- Crucial characterization methods like XRD or PIXE are yet to be implemented