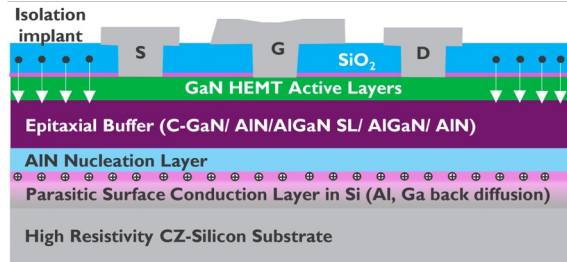


GaN-on-Porous Silicon for RF Applications

Gilles Scheen, Romain Tuyraerts, Pieter Cardinael, Enriqu  Ekoga, Khaled Aouadi, Christophe Pavageau, Amin Rassekh, Massinissa Nabet, Sachin Yadav, Jean-Pierre Raskin, Bertrand Parvais, Mostafa Emam gilles.scheen@incise.com

Parasitic Surface Conduction Layer (PSC)

GaN stack fabrication and the fab process generate a parasitic surface conduction layer that severely degrades RF performance.



S. Yadav et al., IEEE International Electron Devices Meeting (IEDM), San Francisco, USA, 2020, pp. 8.2.1

Diffusion of Al and Ga atoms at the AlN/Si interface

High conduction layer

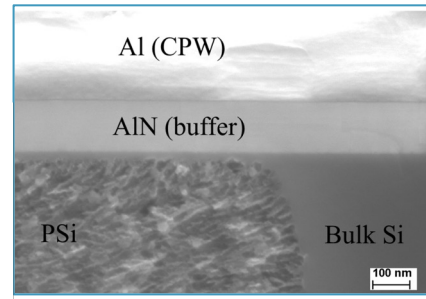
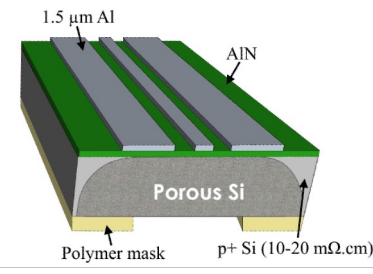
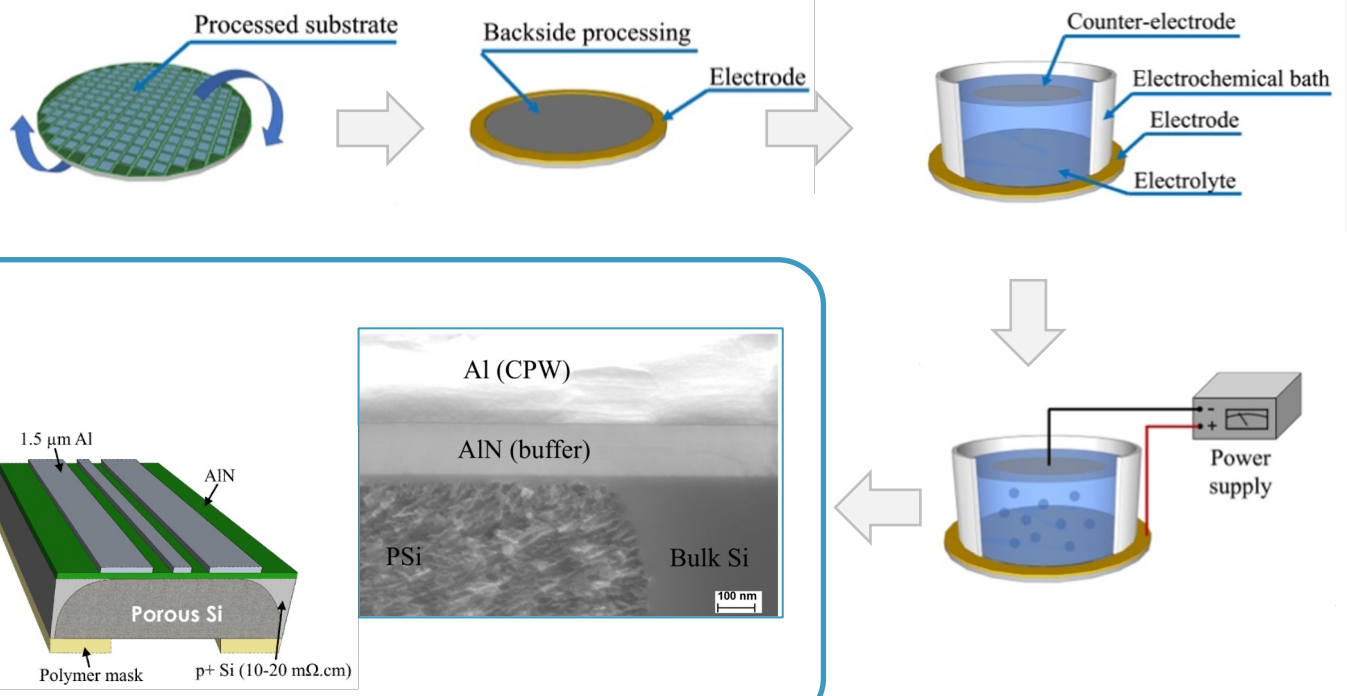
RF circuits suffer from a conductive substrate even with HR-Si

RF Losses and Non-linearities

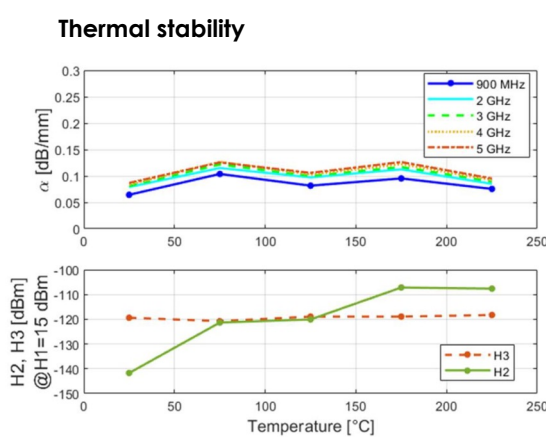
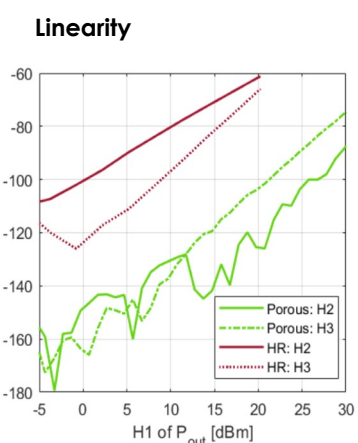
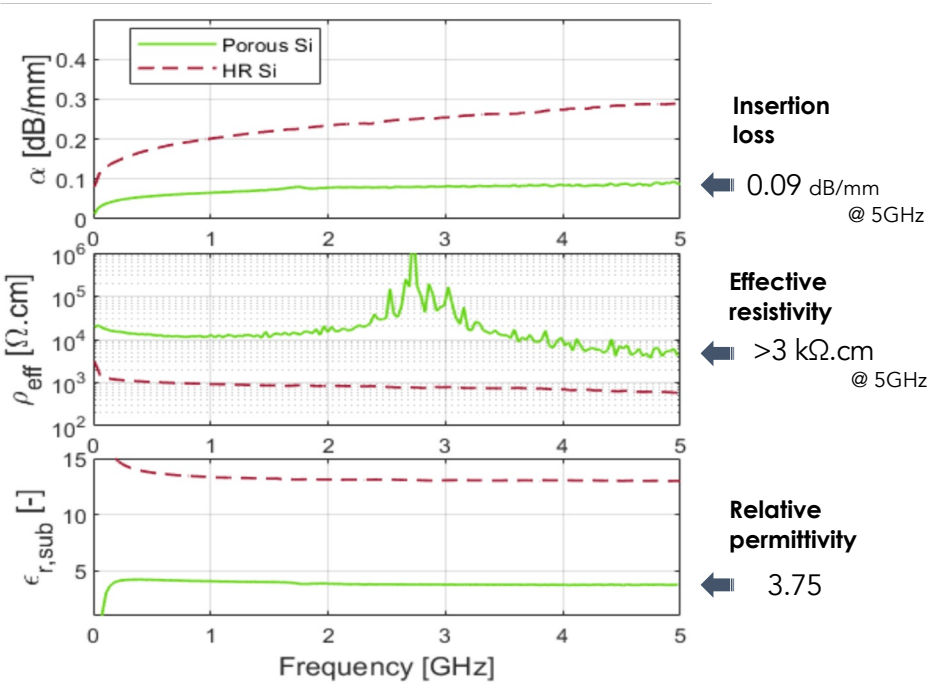
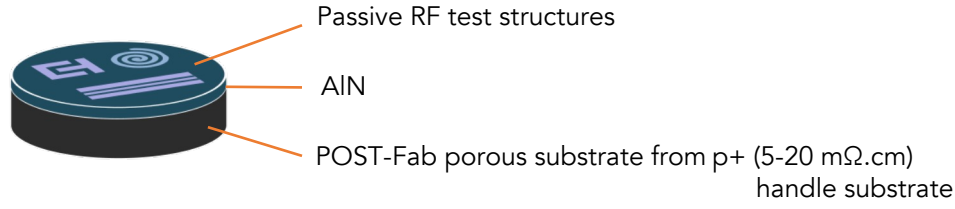
POST-fab porosification

After fab process, the handle substrate is transformed in nanoporous silicon to trap charge carriers and suppress PSC.

- Transparent for fabs
- Frontside circuitry not affected
- Simple and cost-effective
- Localized below areas of interest



AlN-on-Porous



GaN-on-Porous

