Contribution ID: **188** Type: **Oral**

Studies of InP as a sensor material for tracking system based on thin film technology

Tuesday, 7 November 2023 16:40 (20 minutes)

We are exploring the properties of different sensor materials to enable large-scale low-mass tracking detectors for future colliders and other applications. For this purpose, we are targeting materials amendable to fast and economical fabrication methods, for example Indium Phosphide (InP). First devices have been fabricated in different electrode geometries on single-crystal 350 μm thick InP:Fe wafers. In this contribution we present results on fundamental device characterization tests using a variety of methods: IV, CV, response to red laser stimulus (waveform response and spatial scans), response to beta particles from Sr-90 source, area uniformity assessment with focused X-ray beams.

We find the InP material to feature a very fast response, due to the high electron mobility. It is larger than in silicon by about a factor of 4. The timing resolution of about 35 ps was achieved without any special bulk modification techniques. A channel response within 5x5 pad array was characterized. High charge collection was achieved. The area scans with focused X-rays showed a typically uniform response within the electrode area. Several additional features are under investigation, and a set of devices has been irradiated for the radiation tolerance assessment. The compilation of the results supports the initial goal of exploring this material with mass-manufacturing fabrication techniques as the next step.

Early Career

Yes

Primary authors: SUMANT, Anirudha (Argonne National Laboratory); AFFOLDER, Anthony (University of California- Santa Cruz); Dr SPERLICH, Dennis (University of Freiburg); ALMAZAN, Earl Russell (UC Santa Cruz); DYCKES, Ian (Lawrence Berkeley National Laboratory); NIELSEN, Jason (University of California Santa Cruz); OTT, Jennifer (UCSC); METCALFE, Jessica (Argonne National Laboratory); Dr POLEY, Luise (TRIUMF); JADHAV, Manoj (Argonne National Laboratory); HANCE, Mike (University of California Santa Cruz); KIM, Sungjoon (University of Illinois at Chicago); FADEYEV, Vitaliy (UC, SANTA CRUZ)

Presenter: ALMAZAN, Earl Russell (UC Santa Cruz)

Session Classification: RDC3

Track Classification: RDC Parallel Sessions: RDC3: Solid State Tracking