Micromegas Particle Detector

Nuclear Physics SBIR/STTR Exchange Meeting

October 2, 2012

DOE SBIR Phase II, Contract No. DE-SC0004295

(8/15/2011 – 8/15/2013)

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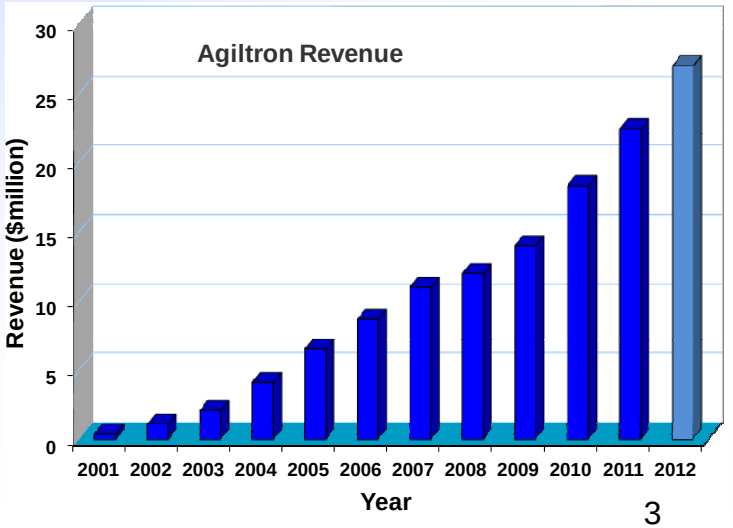
Agenda

- Company Background
- The Need
- Agiltron Approach
- Experimental Results

Agiltron At A Glance

- Established 2001
- Over 100 employees
- $27 million projected 2012 revenue
- 60,000 sq. ft. R&D, manufacturing, and administrative facilities
- ISO 9001 certified optical systems manufacturer
- Inc 500, Deloitte Fast 50 & 500, SBANE Innovation Awards

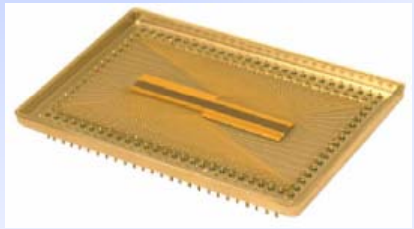


Agiltron's Business Model

- Optical component and systems developer and manufacturer
- Revenue streams
  - Product sales
  - Funded R&D
- Product divisions
  - Fiberoptic Components
  - Infrared Detectors
  - IR and Thermal Imaging
  - Raman Spectroscopy
  - Functional NanoMaterials
- Vertically integrated
- Infrastructure investment
  - People / Equipment / Facilities
- Product differentiation by advanced development

Fiberoptic Repair Kit
PEO(T) / PMA 260 / PMA 265

Non-Mechanical Switch
F-35 JSF



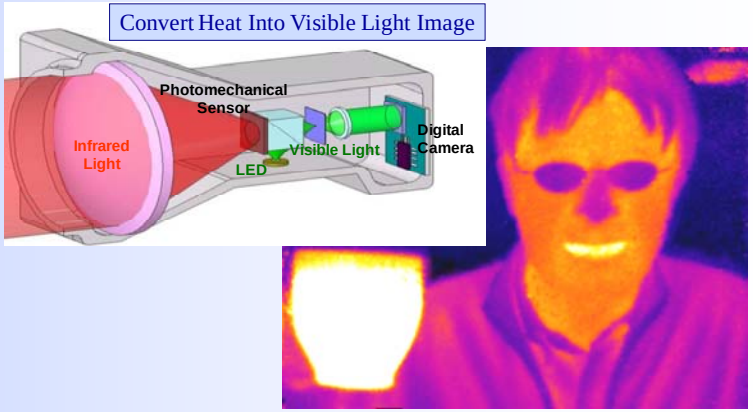
PbS / PbSe IR Detectors

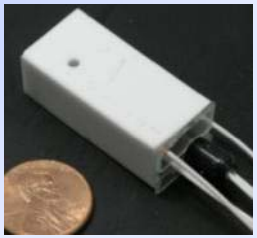
Raman Spectrometers

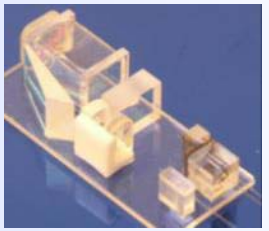
Microfabrication Equipment Suite

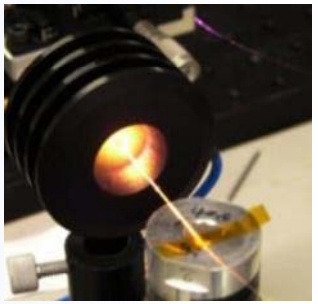
Key Development Areas

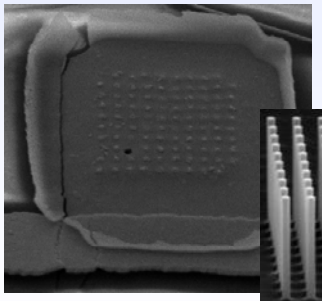
- Chem/Bio/Radiation Detectors
- IR Detectors and Optics
- HFI Sensors
- Photomechanical Imaging
- Microwave Photonics
- Nanomaterials and Devices

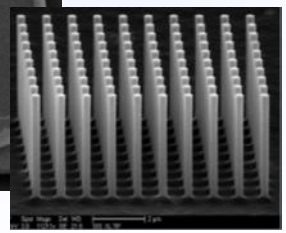


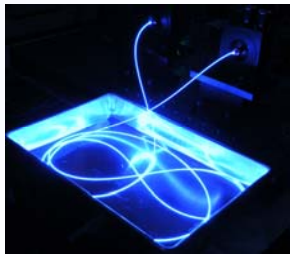






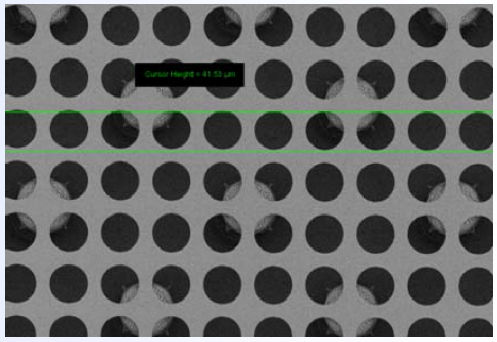


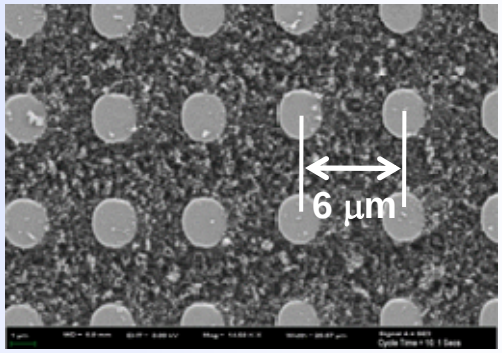


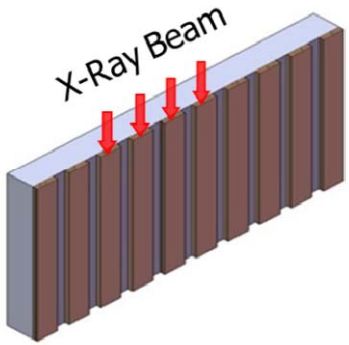


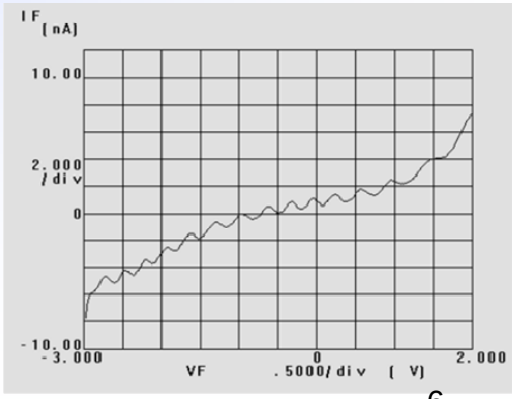
High Energy Particle Detection Programs in Agiltron

- Micromegas
  - DOE SBIR Phase II
- Silicon Microfabricated Neutron Detectors
- Nano-Particle Loaded Polymer X-Ray Detector
- Low Cost Microfabricated Gamma Detectors





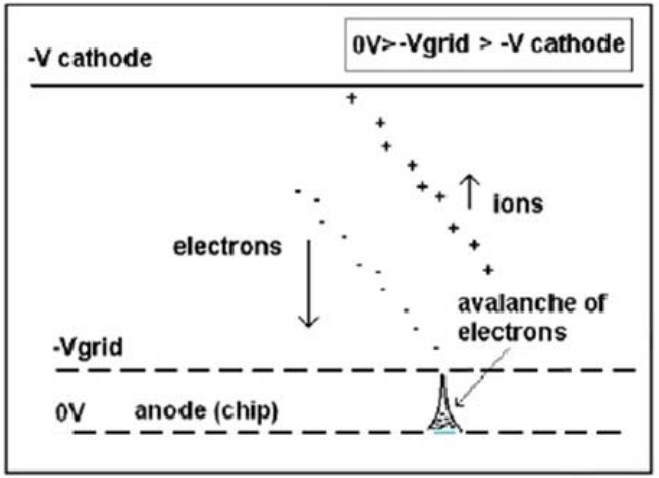




The Need

Nuclear physics research need position sensitive charge particle and gamma ray tracking devices

- Micromegas exhibits excellent stability, fast response, excellent spatial uniformity and energy resolution, and exceptionally high positive ion collection efficiency.
- But needs further improvements in performance and reproducibility which can be achieved by microfabrication.



Agiltron's Approach

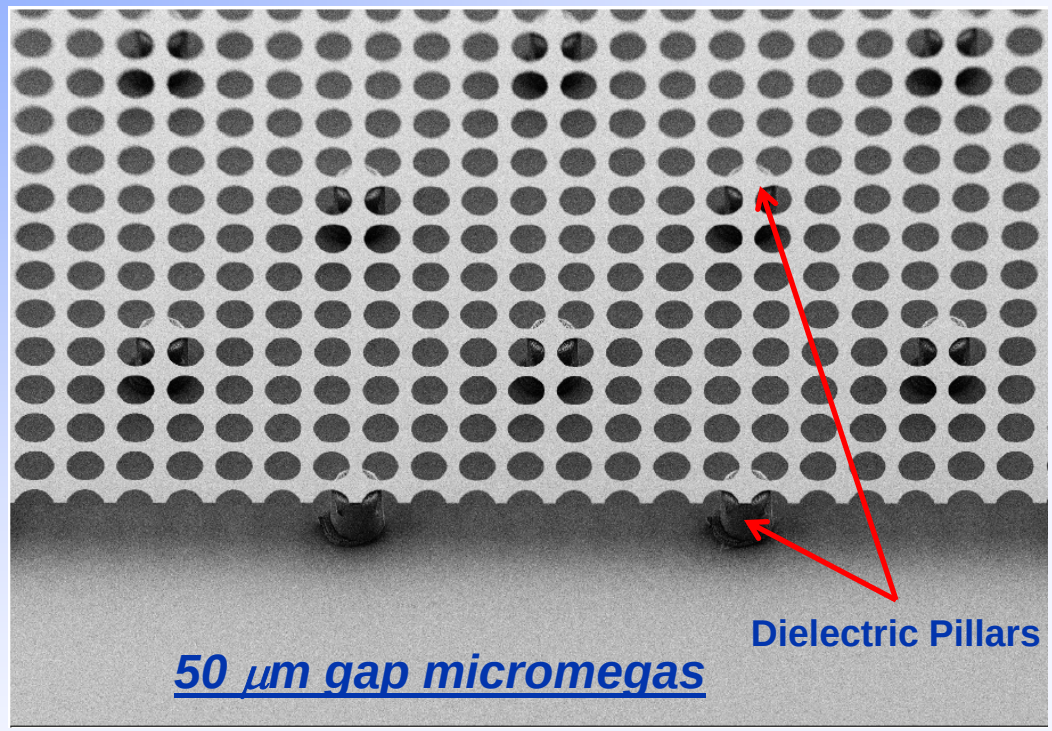
- Design and fabricate mesh with necessary structural integrity, flatness, parallelism and spark-resistance.
- Develop and fully optimize micromegas device structures, and micro-fabrication and assembly procedures for low cost manufacturing in large areas.

Agiltron's goal is to significantly improve the high energy particle detector performance, and become a leading commercial supplier of instrument-grade radiation detectors; and compact/low cost/high volume radiation detectors

Features & Benefits

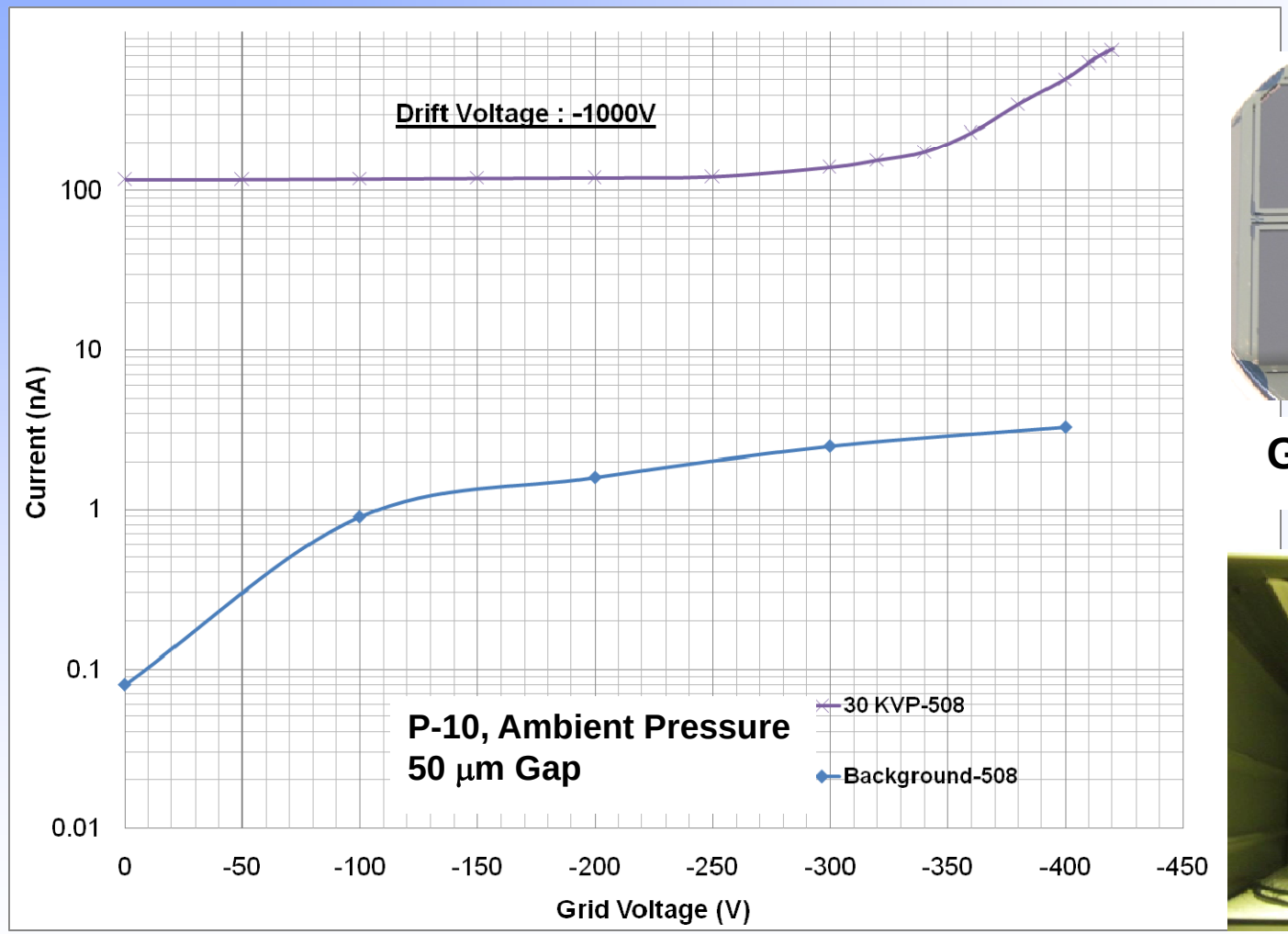
Features	Benefits
Specially Designed Mesh Electrode	• Spark-resistance and long life • Durable performance • High gain • Tunable performances
Micro-Fab Process	• Accurate dimensional control • Uniform performance in large areas • Design flexibility • Scalable • Low manufacturing cost

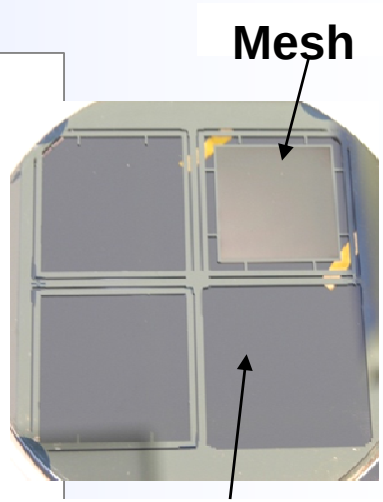
Micromegas via Micro-Fab Process



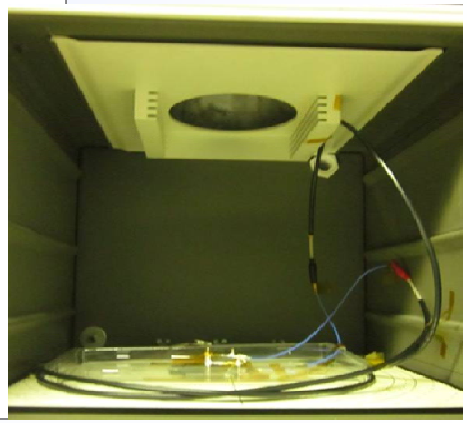
There are 474 X 474 36 um diameter holes within one square inch mesh area, 54 um pitch. Pillars are 64 um diameter on a 156 um pitch.

X-Ray Detection



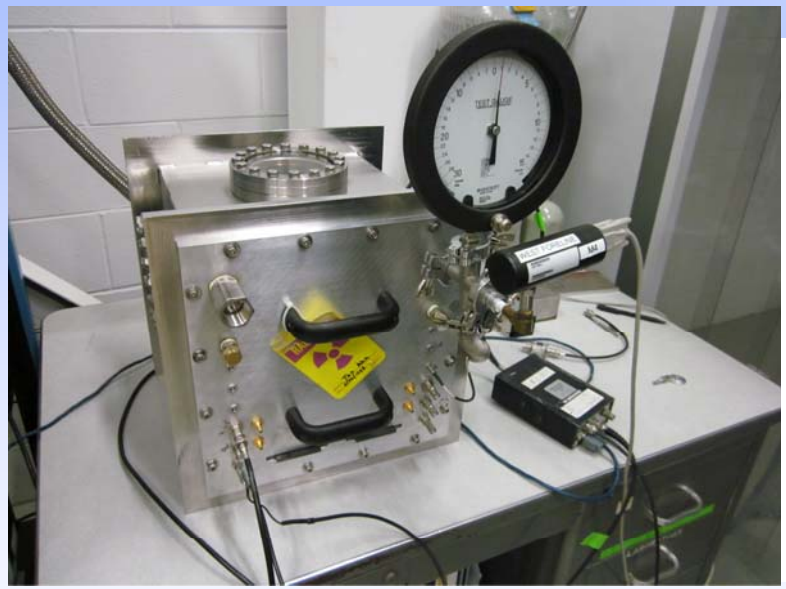


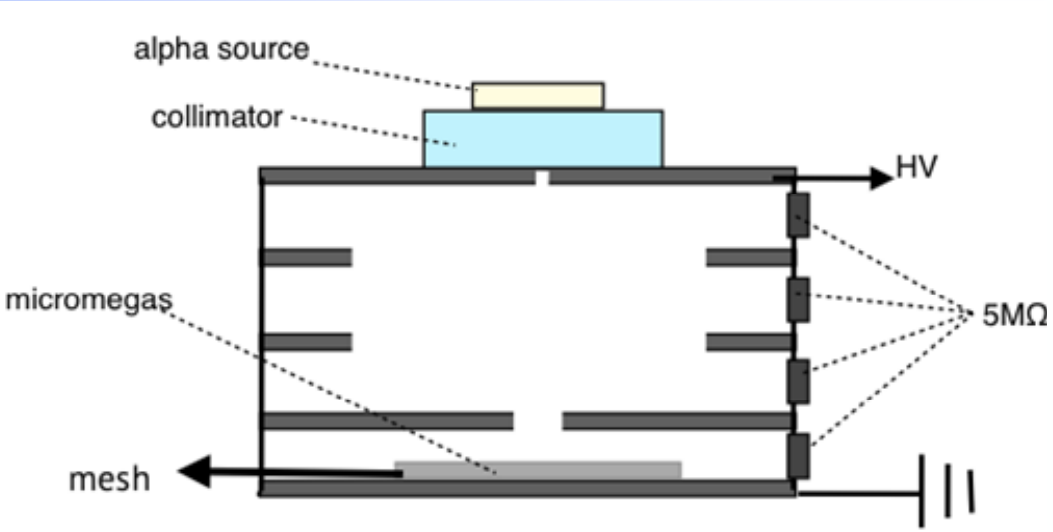
Ground Plane with Pillars



Alpha Radiation (NSCL)

0.99μC Am^{241} Alpha Source





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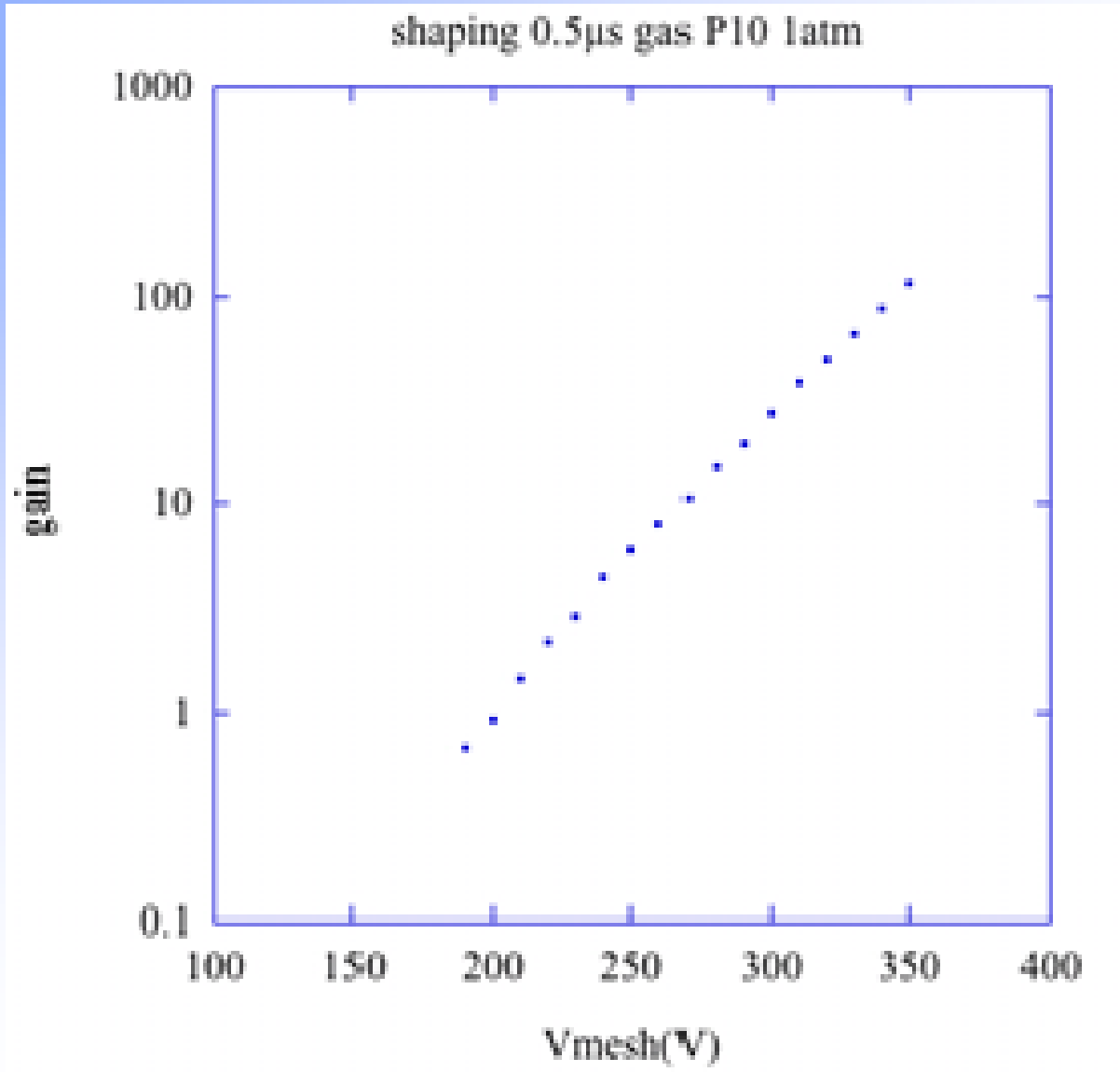

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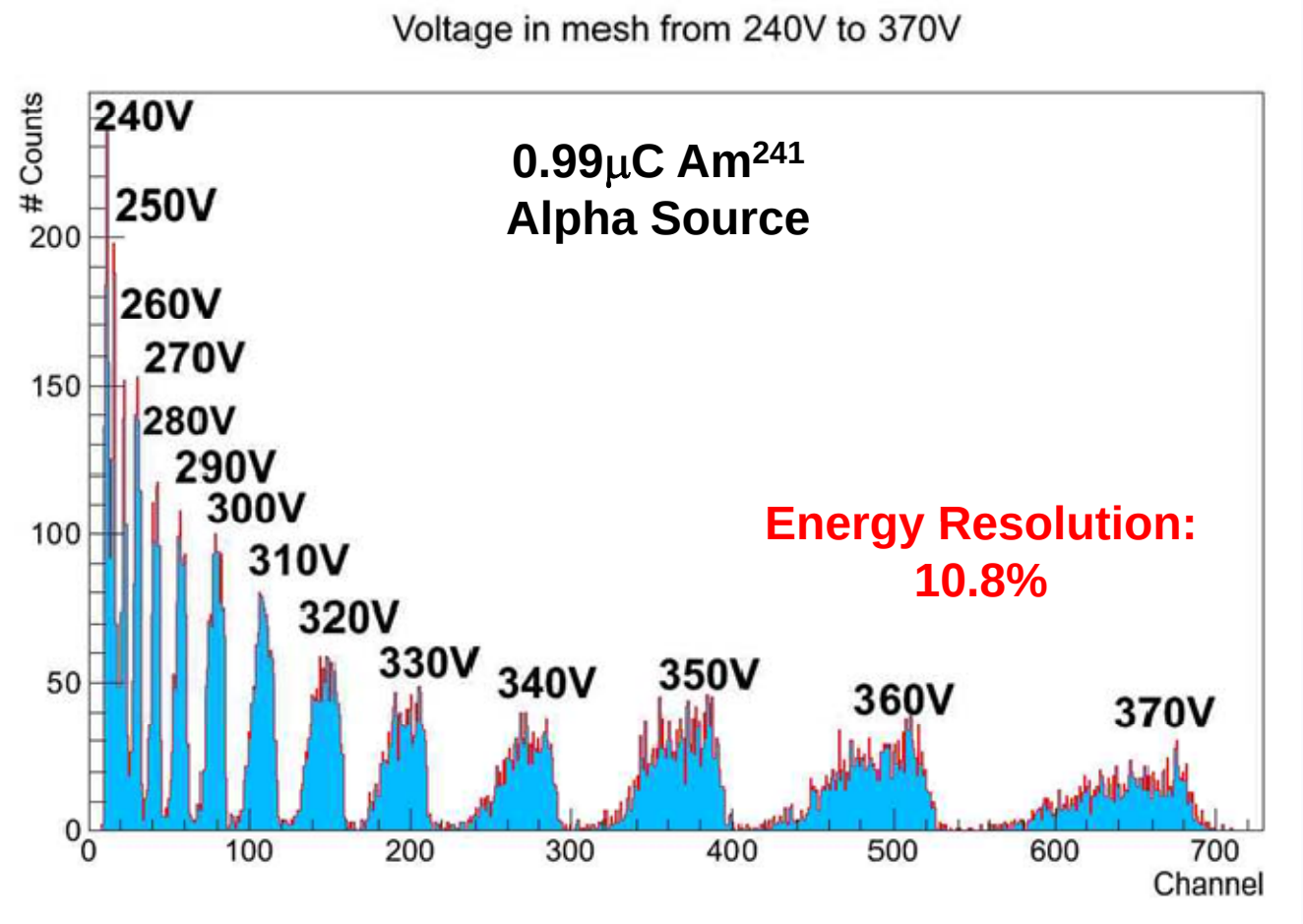
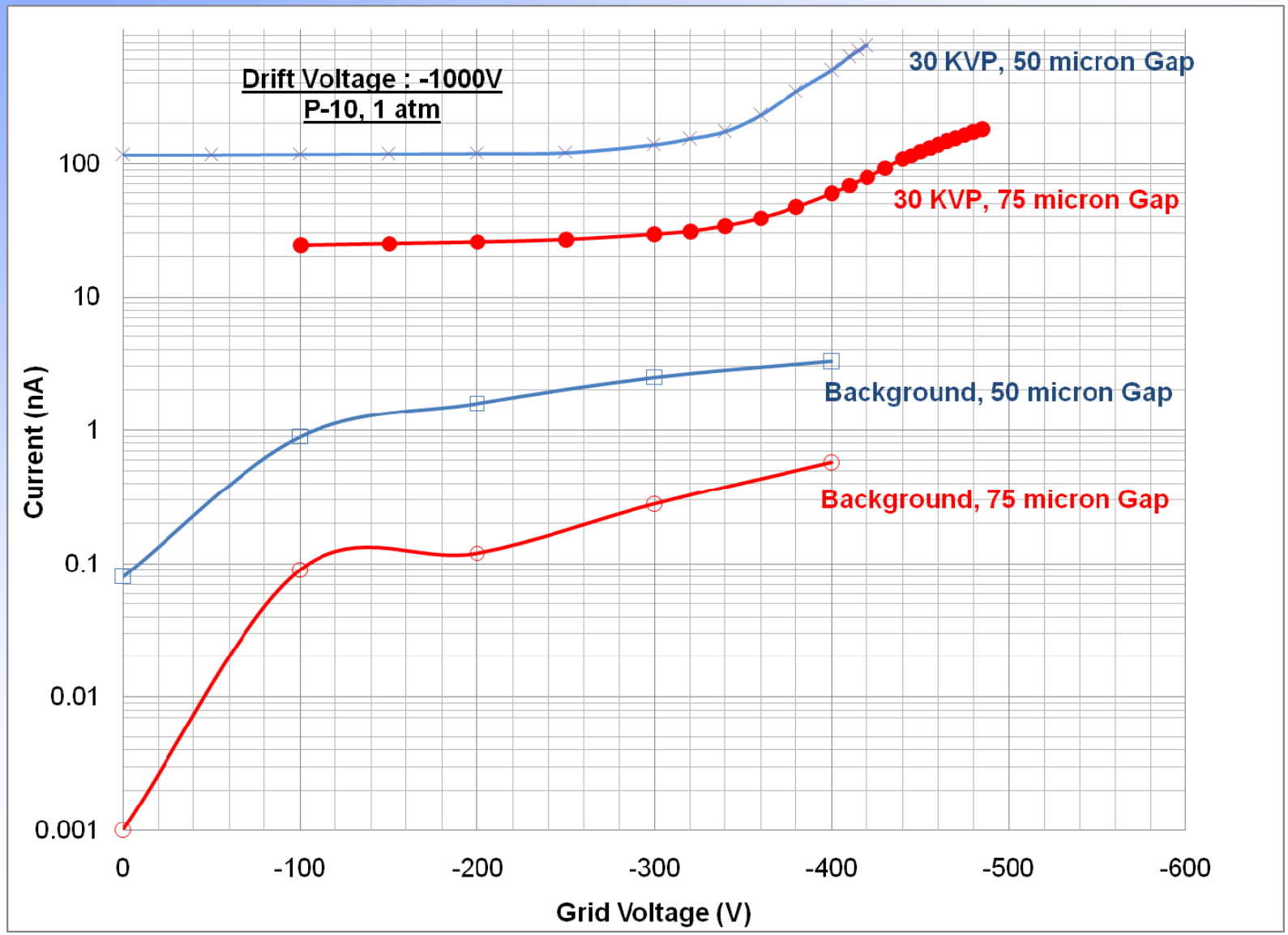


Recent Improvements

- In crease mesh gap to 75 μm from 50 μm.
- Redesigned the masks and micro-fab procedures have improved yield to over 75%
- Redesigned the masks to accommodate large area device fabrication via stitching of meshes

Improved Micromegas



Q & A