

## Gridded Ionization Chambers

### High Bandwidth/Low Rise Time Ion Chambers

ADC in collaboration with APS/Argonne National Lab has developed a gridded ionization chamber using the present parallel plate ion chamber<sup>1</sup>. The original idea for Gridded Ionization Chambers used in Time Resolved X-Ray Absorption Spectroscopy was described Journal of Physics: Conference Series 425 (2013) 092010<sup>2</sup>. Gridded Ionization Chambers improves bandwidth and reduces rise time compared to standard ion chamber designs.

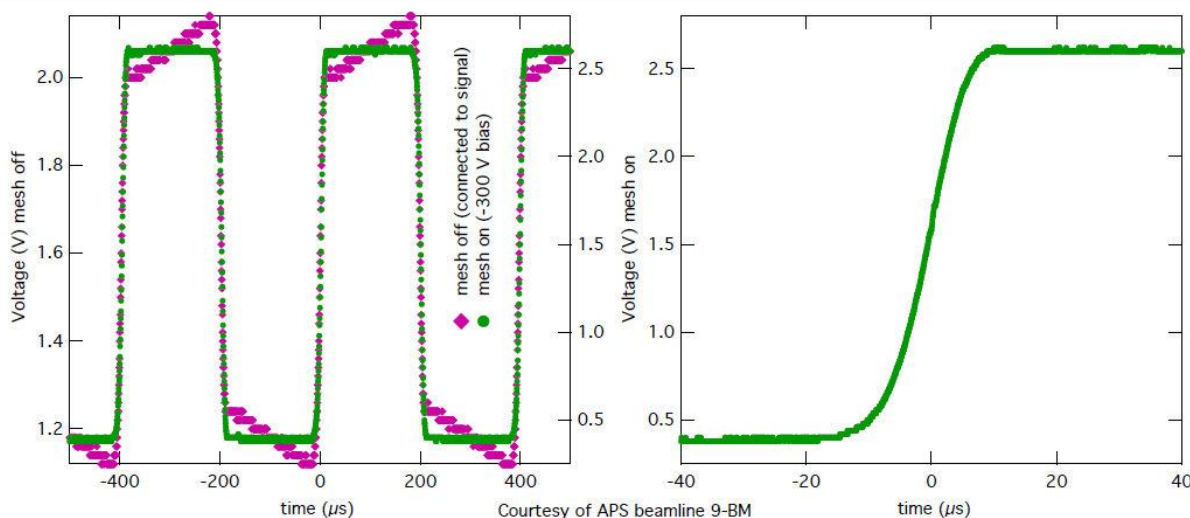


In a parallel plate ion chamber, the ionization current is induced by the presence and locations of ions and electrons within the electric field. The length of the ionization pulse is dependent upon the time that it takes for the ions and electrons to collect on the electrodes. Because of this, the collection speed of standard designs is limited by the velocities of the large, slow moving ions.



Using ADC's new gridded ionization chamber, the ionization current reacts only to the presence of electrons within the electric field while the ion charges are ignored. *Eliminating the effects of the slow-moving ions reduces the rise time by roughly at least 10 orders of magnitude. The overall result is a drastic increase in the rise time of the ion chamber.* ADC has developed this design as an add-in to its entire ion chamber line. To learn about available models, contact ADC to discuss custom applications.

The following shows latest measurements on the gridded ion chamber done at the APS Spectroscopy Beamline 9-BM. See the plot below that shows the response to a chopped beam. It shows the improvement when the grid is turned on. Without the grid there is a slow and fast component. With the grid the response time is about 20 microsec.





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The XSD Spectroscopy Group operates the bending magnet beamline 9-BM to serve the materials science and chemistry user communities. It provides a focused, tunable x-ray beam for XAFS and XANES experiments with special capabilities for lower energy x-rays.

<https://www1.aps.anl.gov/Spectroscopy/Beamlines/9-BM>

1. 12th International Conference on NEW YORK CITY JULY 6-10 2015- Synchrotron Radiation Instrumentation (SRI 2015) - Tim Shea, Alex Deyhim
2. Journal of Physics: Conference Series 425 (2013) 092010; Gridded Ionization Chambers for Time Resolved X-Ray Absorption Spectroscopy- O Müller<sup>1</sup>, J Stötzl, D Lützenkirchen-Hecht and R Frahm