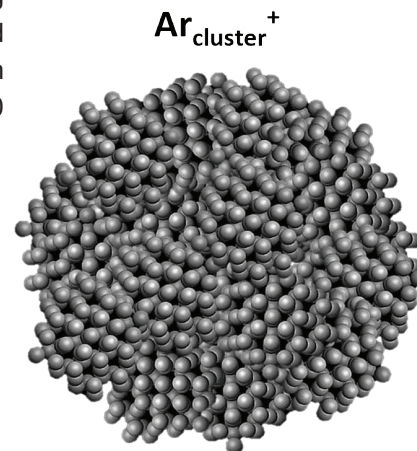


## Gas Cluster Ion Beam (GCIB) UPGRADE for VersaProbe II, III, and 4

The PHI 20 kV gas cluster ion beam (GCIB) option may be used for surface cleaning prior to analysis and for depth profiling from nanometers to microns in depth. Ionized gas clusters offer a gentler approach to sputtering and cleaning fragile materials such as polymers without damaging the surface. Cluster size can be tuned from 800-3000 Ar atoms for the appropriate organic or inorganic application.

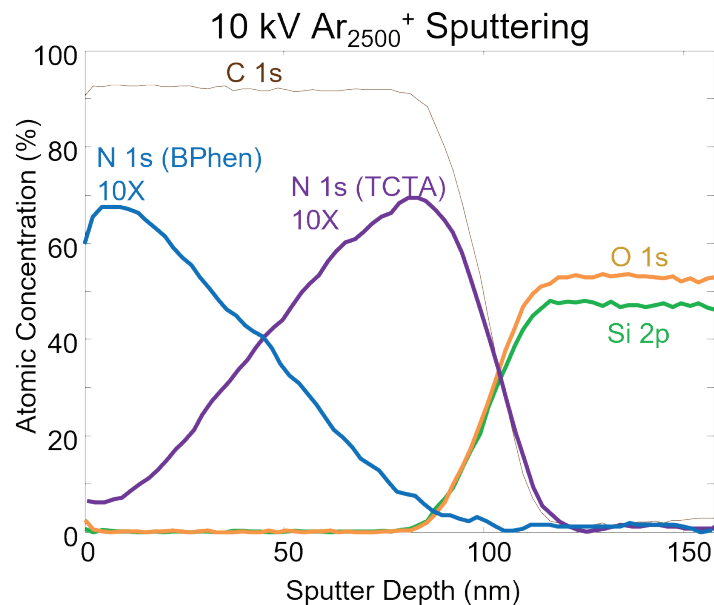
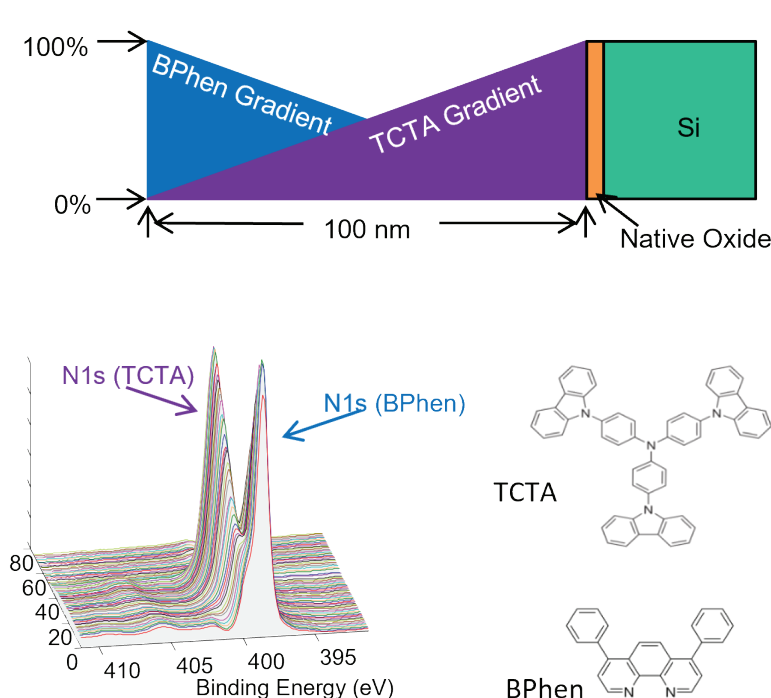
### Key Features of GCIB:

- Nondestructive depth profiling of organic materials
- Small cluster capability for inorganic depth profiling
- Surface sputter cleaning without damaging surface
- Cluster measurement tool provides feedback on cluster size
- Can be easily combined with monoatomic Ar<sup>+</sup> for depth profiling of mixed inorganic/organic materials



### Analysis Examples: Sputter Depth Profile of a Graded OLED Test Structure

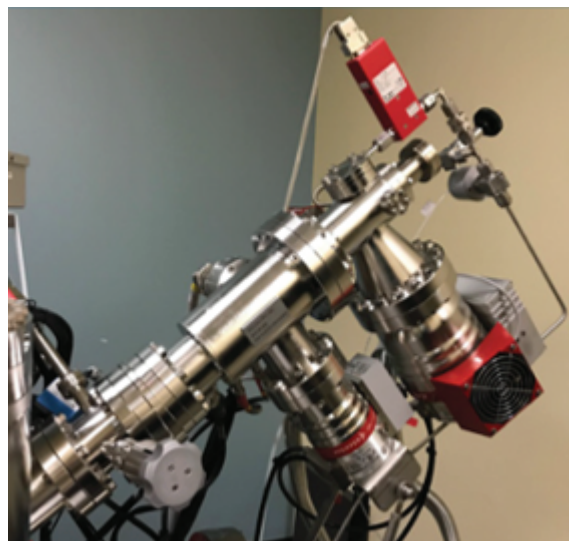
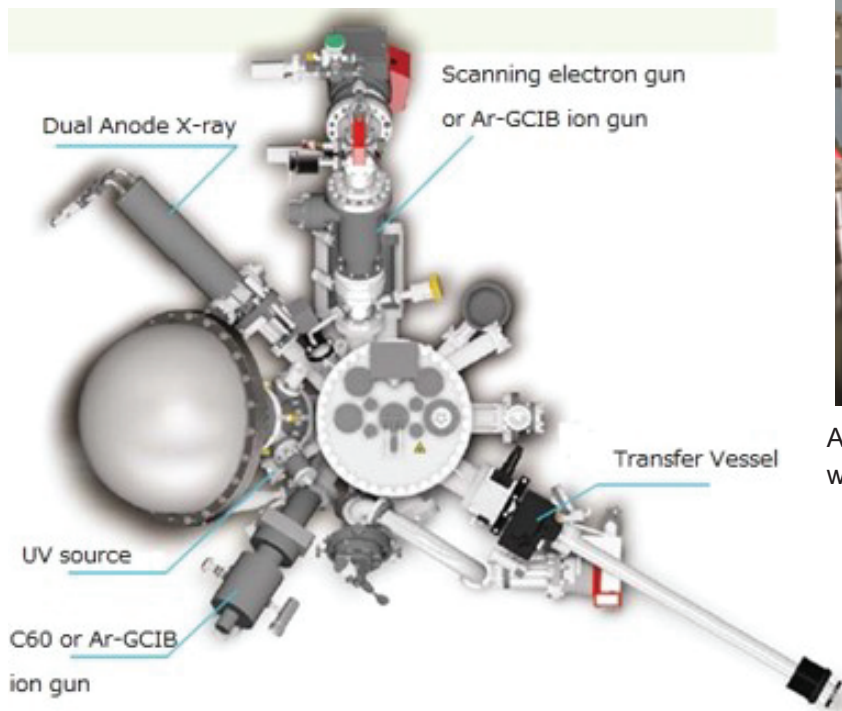
N chemistry is followed with depth as a marker for the different organics present in the structure. The GCIB preserves the chemistry of the organics so the concentration of the different N chemistries can easily be followed with depth throughout the bilayer structure.



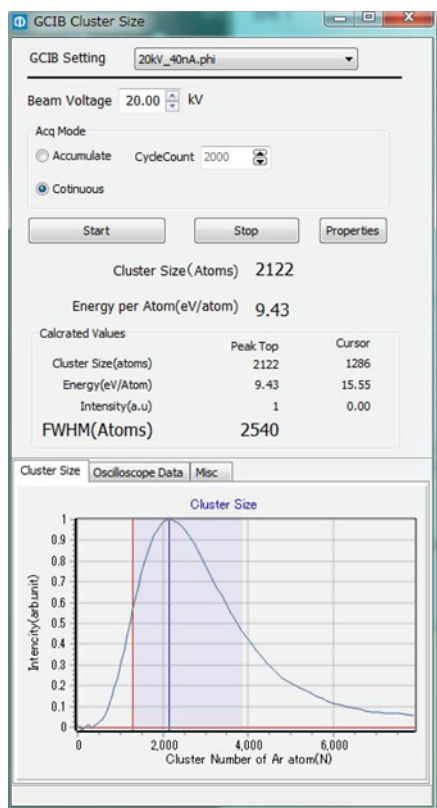
Sample courtesy of Prof. Russell Holmes, U of MN

## GCIB Hardware:

The dedicated GCIB gun has two port options based on the configuration of a user's *VersaProbe* instrument, allowing greater flexibility for combination of options on one instrument.



Additional Requirements: main chamber ion pump will be replaced with a main chamber turbo pump.



## Optional Cluster Size Measurement Tool:

The cluster size measurement tool allows measurement of the cluster size distribution for a given setting.

The measurement is software-controlled for ease-of-use.

Cluster size and energy per atom can be measured and tuned for the specific sample/materials of interest.

The measurement is completed within 10 seconds and can be exported to CSV.