

# SMART Grids Observer

## Events and News

- Visit Dune Sciences at M&M Richmond July 27-29. **Booth 215**
- Dune Sciences to sponsor session A-14, *In Situ Microscopy*, Tuesday 8:00 am and 1:30 pm Room E11C
- *New Products* available see page 2 for information

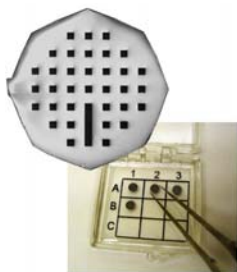
## Interesting Links

[Safer Nanomaterials and Nano-manufacturing Initiative](#)

[CAMCOR](#)

[ZS Genetics Inc.](#)

[SMART Imaging Technologies](#)



Standard grids are available in octagons, but other geometries available on request.

## NEW Package Pricing !

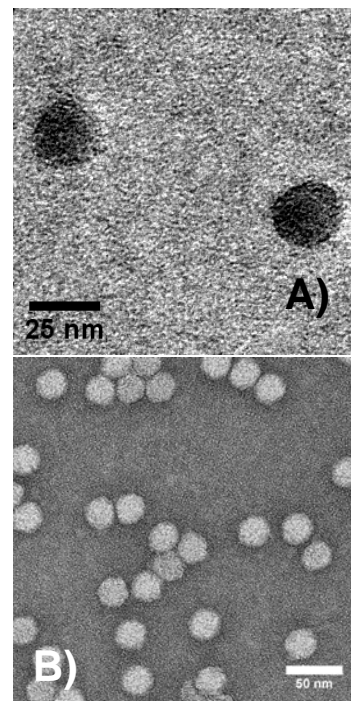
**10 SMART Grids \$250**

See [www.dunesciences.com](http://www.dunesciences.com) for more information

## Functionalized SMART Grids emerging as key enabler for microscopy of biomaterials

Dune Sciences, Inc. demonstrated new ability to tether biological molecules to SMART Grids for characterization using electron microscopy. The surface chemistry of the SMART Grids is modified to promote the covalent attachment of biological molecules through reactive groups on the molecules. Using both our amine-functionalized grids and our new epoxide-functionalized grids, we demonstrated the ability to achieve excellent dispersion of isolated adeno-associated virus (AAV-2) particles. The grids act as a concentrator of the virus from solution allowing for higher coverage with reduced amounts of virus. In addition, they remove the uncertainty of finding the particles since they cover the grid surface. SMART Grids can also be used in conjunction with cryoEM.

The BF TEM images on the right show A) *unstained* AAV-2 bonded through surface epoxide groups on the SMART Grids and B) good coverage of single AAV-2 particles on amine-grid surface prepared using surface linker and uranyl acetate-staining. Excess stain was rinsed from the grid surface.



## Dune collaborating with NIOSH in project to standardize metrology methods for airborne nanoparticles

Dune will collaborate with NIOSH to develop grid geometries, support films and functionalization chemistries that will improve sizing and characterization of aerosol generated nanoparticles.

Areas of collaboration will include:

- Reduced time to prepare TEM samples
- Improved sample quality (reduced agglomeration, and better collection efficiency)

- Better reproducibility for comparison of data sets

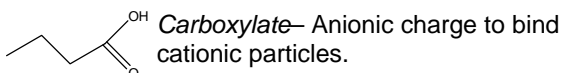
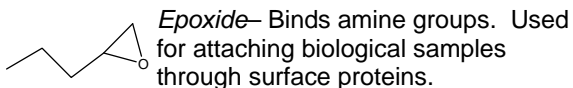
For more information about this NIOSH program contact:

Aleksandr Stefaniak at [boq9@cdc.gov](mailto:boq9@cdc.gov)

Dr. Stefaniak is a Research Industrial Hygienist and Co-coordinator of the NIOSH Nanotechnology Research Center critical research area on nanoparticle measurement .

## New Surface Chemistries for SMART Grids

New surface chemistries are now available:



Call Janet Teshima for more information and quotes

## Contact Information

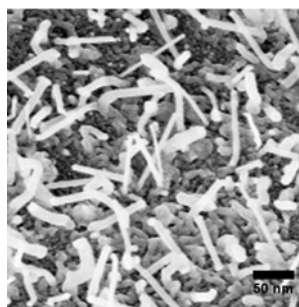
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## Science and Vision

The founders of Dune Sciences, John Miller and Jim Hutchison recognized that the TEM grid could become an active, addressable platform versus a passive sample substrate. From this vision came SMART Grids™, functionalized grids for microscopy (optical, SEM, TEM, AFM, surface analysis). Since spinning out of the University of Oregon in 2006, Dune has continued to develop new surface chemistries in close collaboration with Jim's lab ([Hutch Lab](#)) the UO-Center for Materials Characterization ([CAMCOR](#)). Dune's staff encompasses broad expertise in a variety of disciplines including electron microscopy, surface chemistry/interfaces, sample preparation, materials sciences, nanotechnology, and microbiology. We would be delighted to discuss how we can meet your EM needs. Call us to discuss your needs

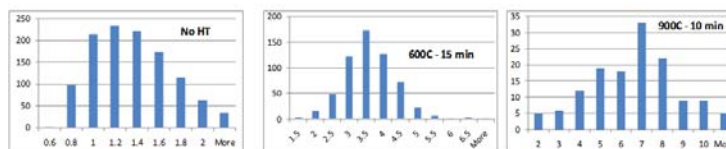
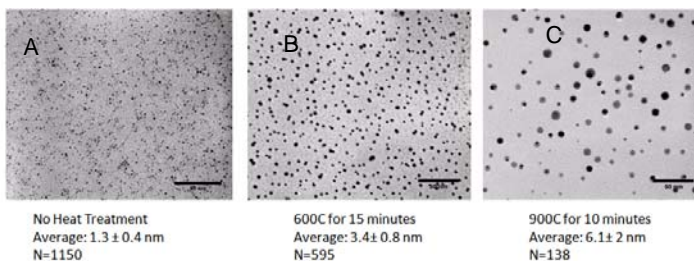


Scanning electron micrograph of ZnO nanowires grown on Smart Grid functionalized with a ZnO seed layer and gold nanoparticle catalysts. Smart Grids can be used in a wide variety of complimentary analytical characterization tools. (Images courtesy of Krista Hill, University of Oregon.)

## Proving the concept of Lab on a Grid

The concept of lab on a grid is simple; TEM grids serve as a substrate for accommodating multiple processing steps and analyses. SMART Grids are well suited to be the "Lab on a Grid" since the SiO<sub>2</sub> membranes have excellent chemical, physical, and thermal stability and compatibility. In addition, the SiO<sub>2</sub> can be functionalized to serve as a platform for chemistry and biochemistry directly on the grid surface. Dune is investigating applications in nanomaterials, bio-nanotechnology, electronics and environmental health.

The figure on the right shows BF TEM images of Au NP's without heat treatment (A), after 15 minutes at 600°C (B) and after 10 minutes at 900°C (C). The average particle size increased with heat treatment and Gaussian distributions were observed.



Development and characterization of nano-scale materials can be performed using SMART Grids combined with flexible surface chemistries from Dune Sciences.

