UNIVERSITY OF NOTRE DAME

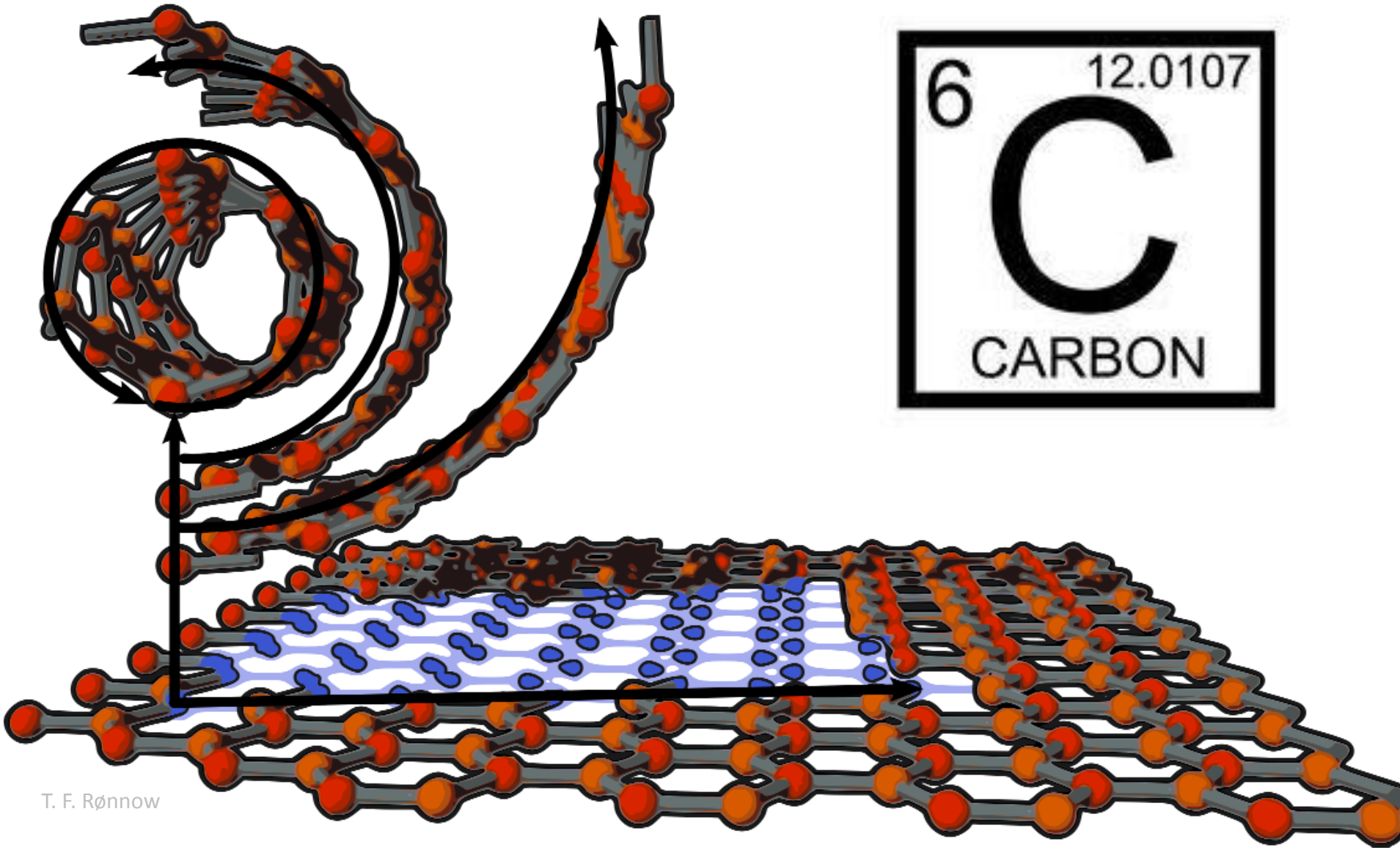
Department of Civil & Environmental Engineering & Earth Sciences

Substrate Preparation Using Mineral Nanoplates for Synthesizing Carbon Nanotube Arrays

Haitao Wang and

Chongzheng Na

Carbon Nanotube (CNT)



T. F. Rønnow

Vertically-Aligned CNT Array

Membranes

Supercapacitors

Super hydrophobic surfaces

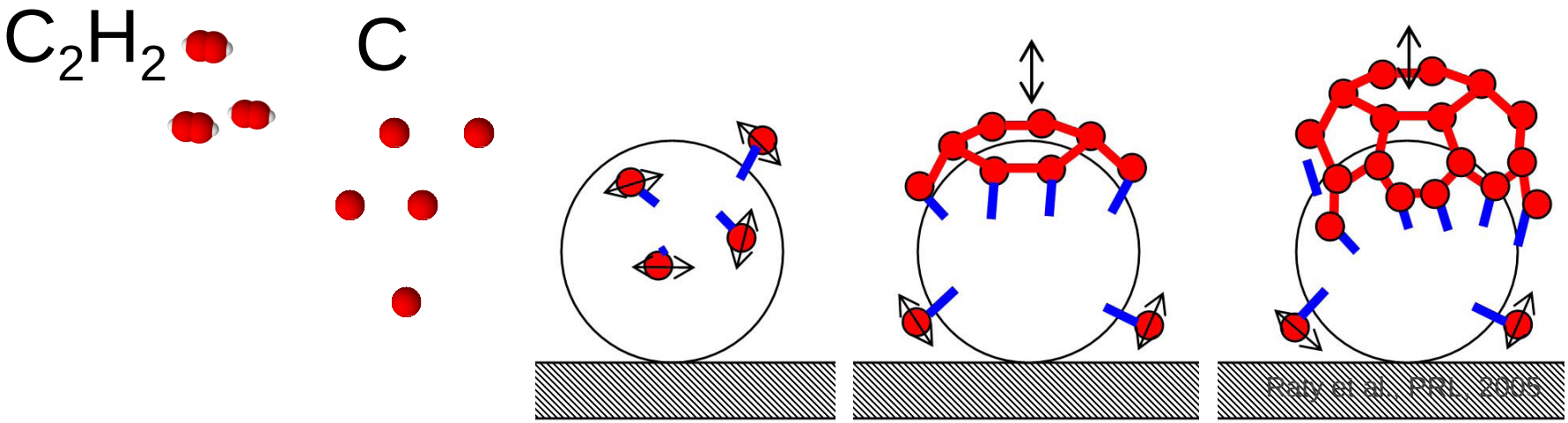
“Gecko” tapes

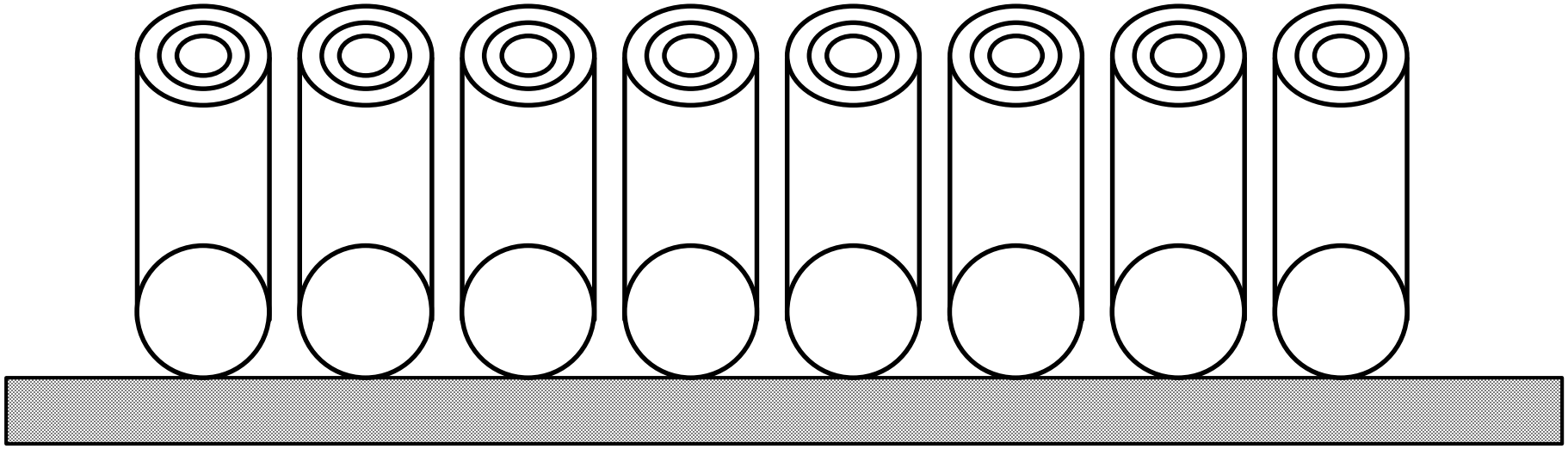
Li ion batteries

Polymer-nanotube composites

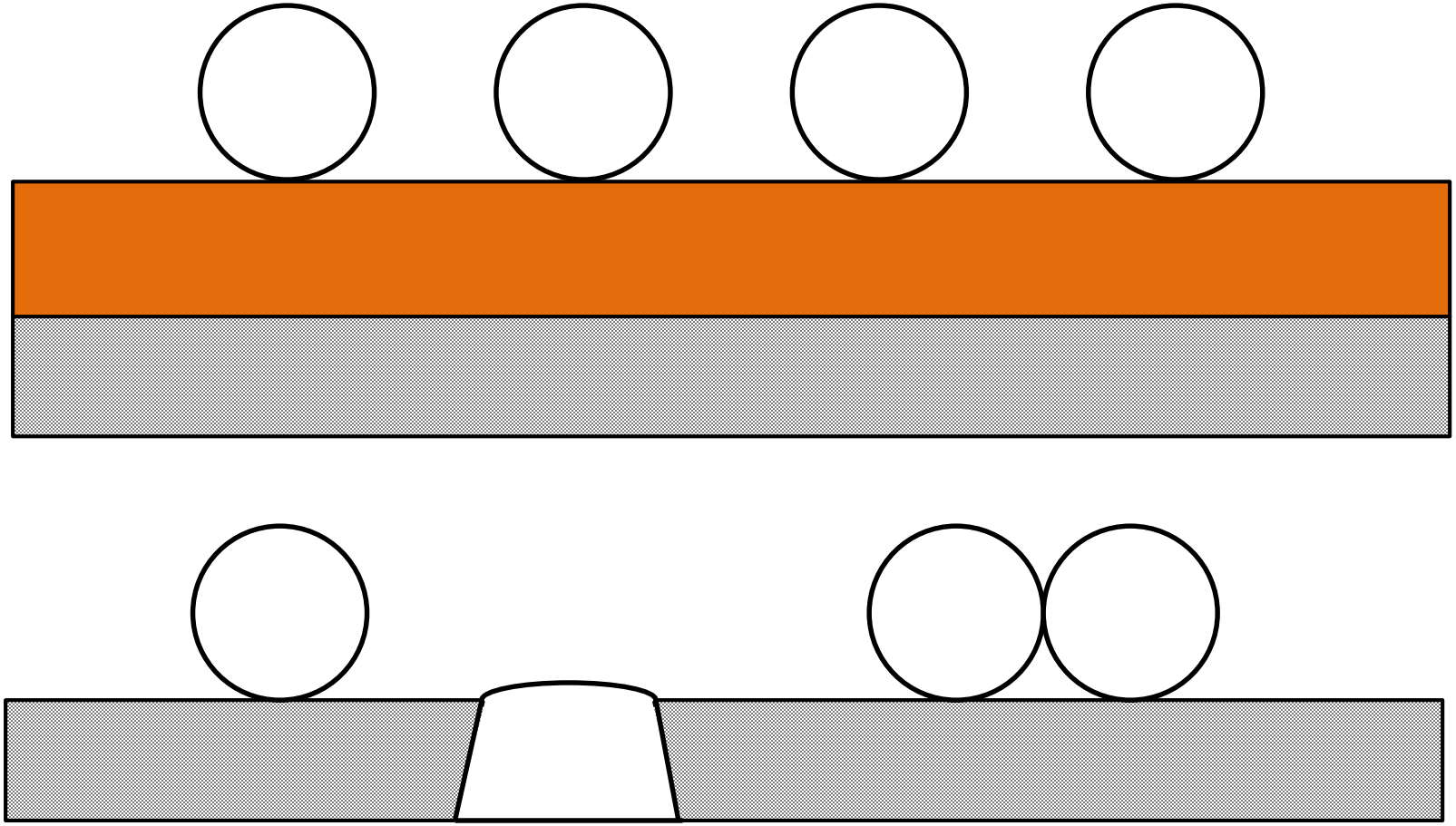
Field emission sources

Synthesis: Chemical Vapor Deposition

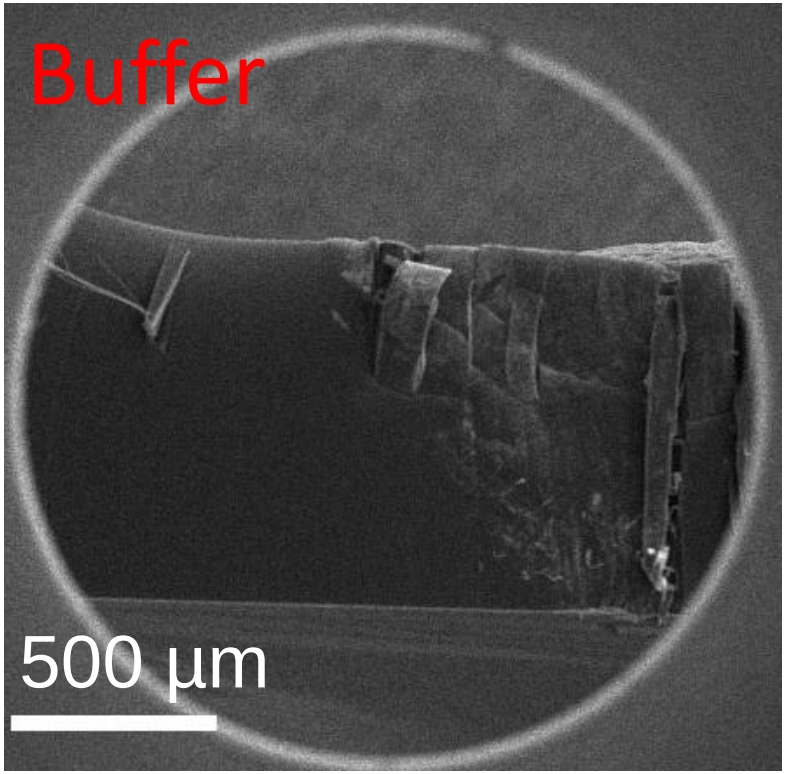


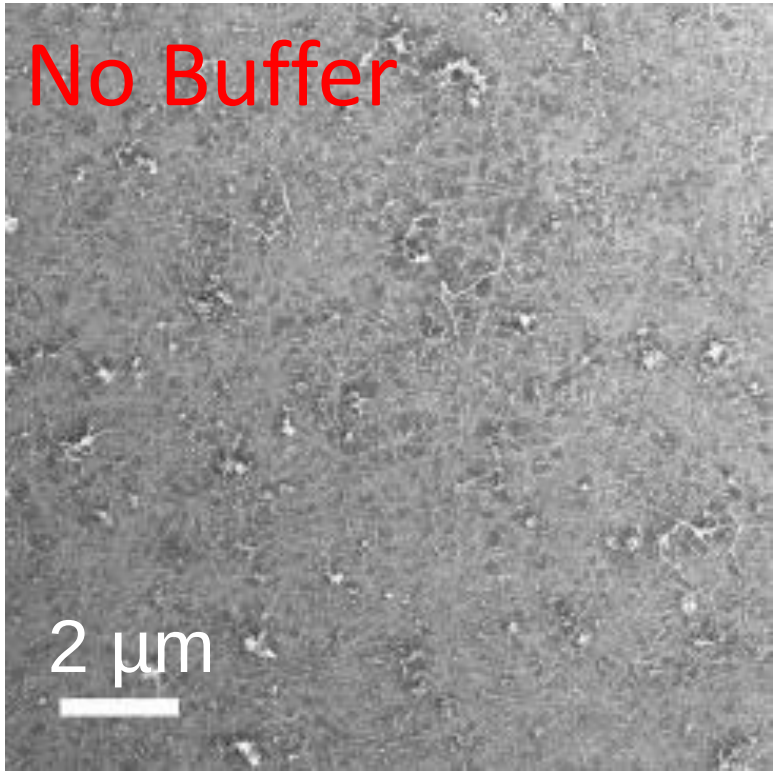


Hero behind the Scene: Al_2O_3 Buffer

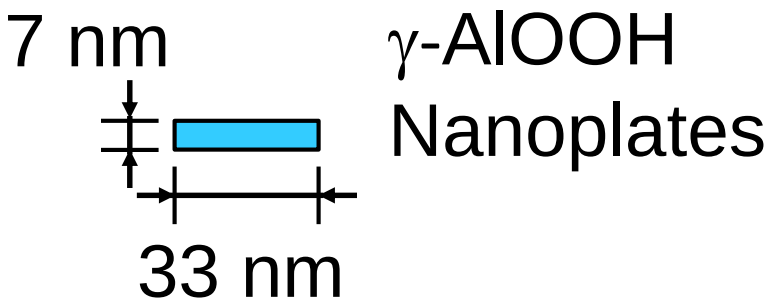


Importance of Al_2O_3 Buffer Layer

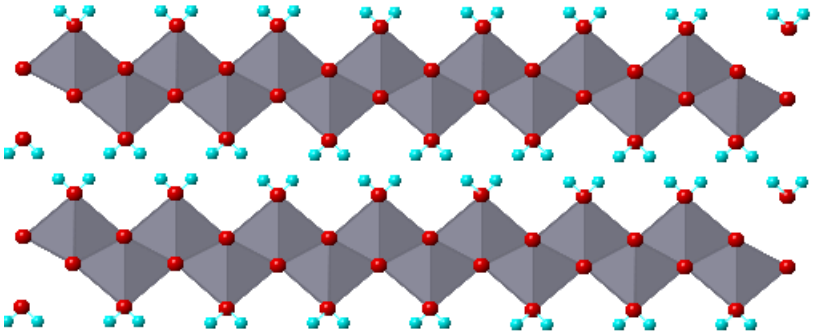




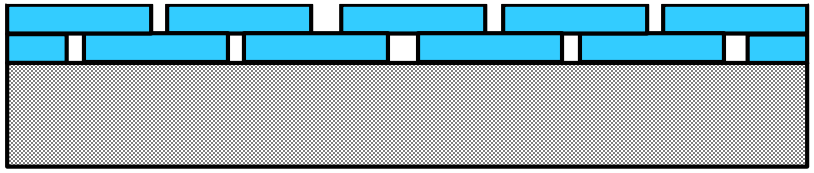
Our Method for Buffer Preparation



γ-AlOOH Nanoplates

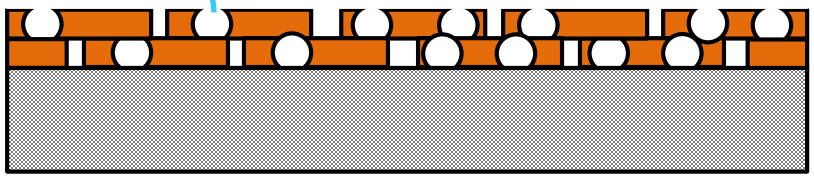


Layer-by-Layer Assembly (LBL)

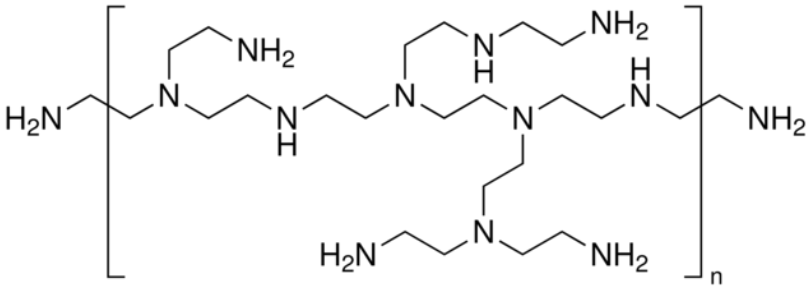


H_2O

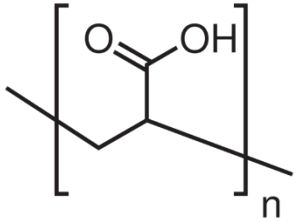
Annealing



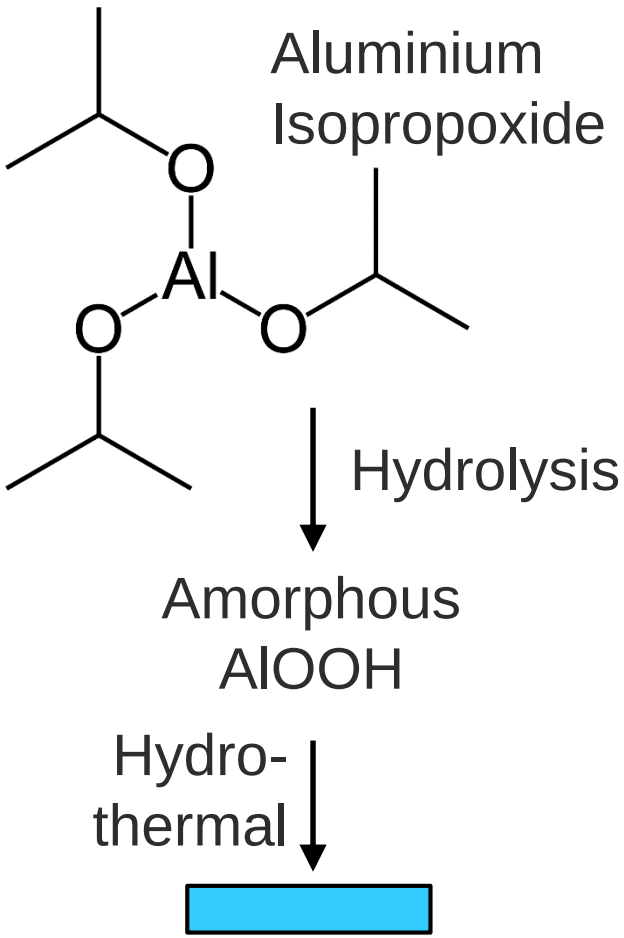
PEI (Polyethylenimine)

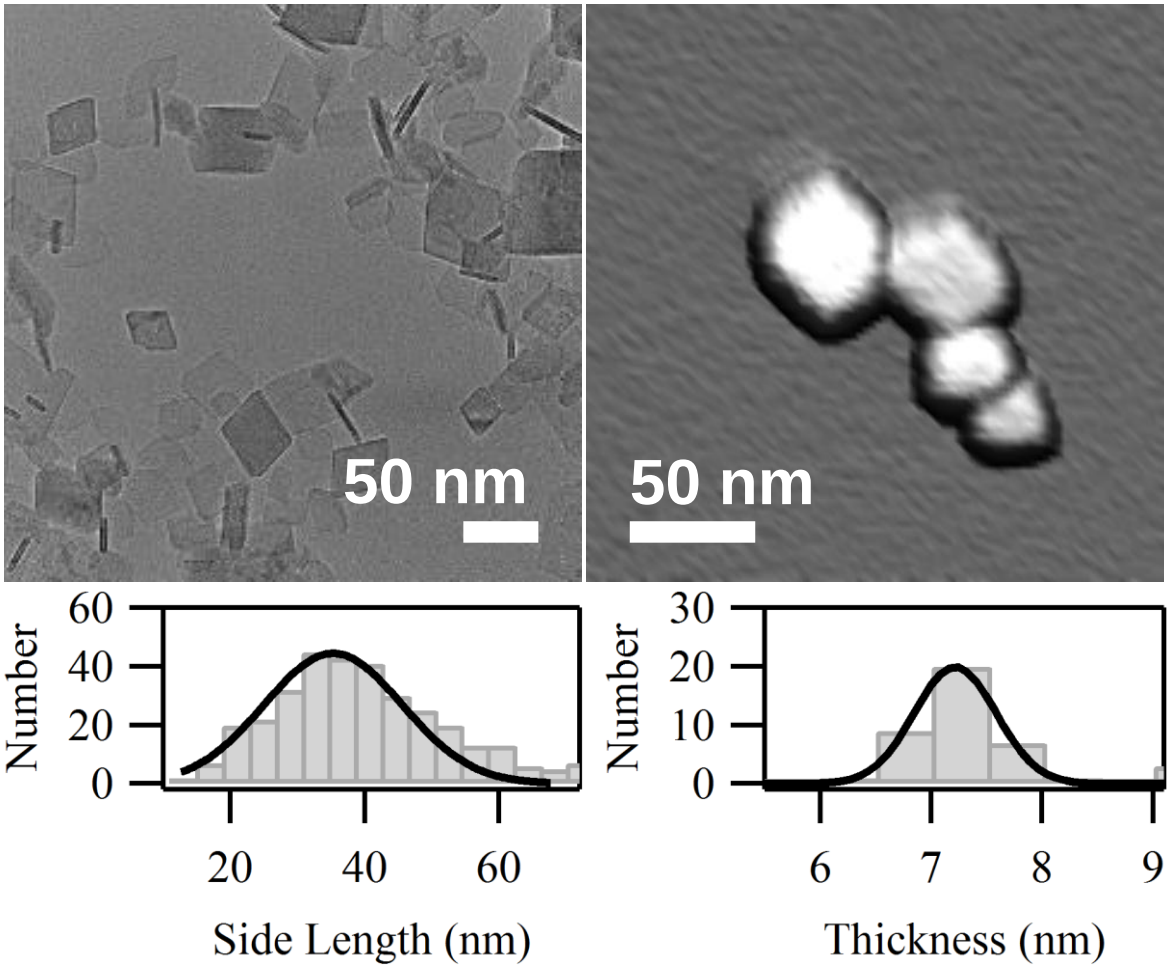


PAA Poly(acrylic acid)

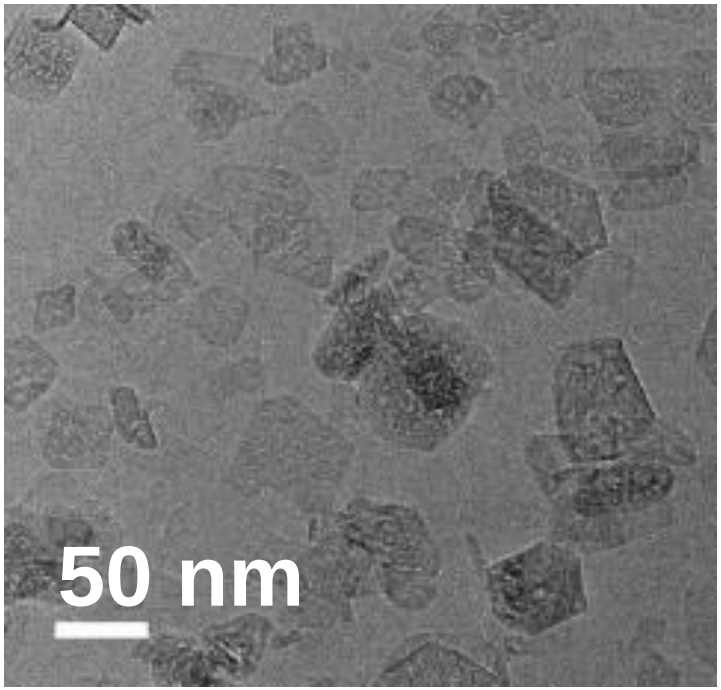


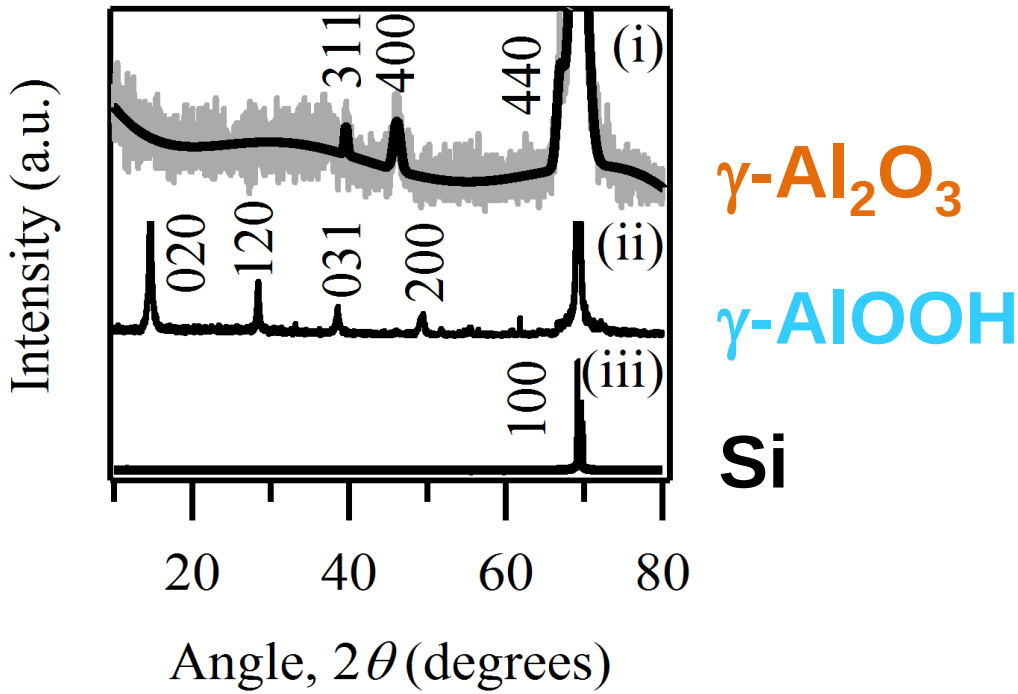
Boehmite (γ-AlOOH) Nanoplates



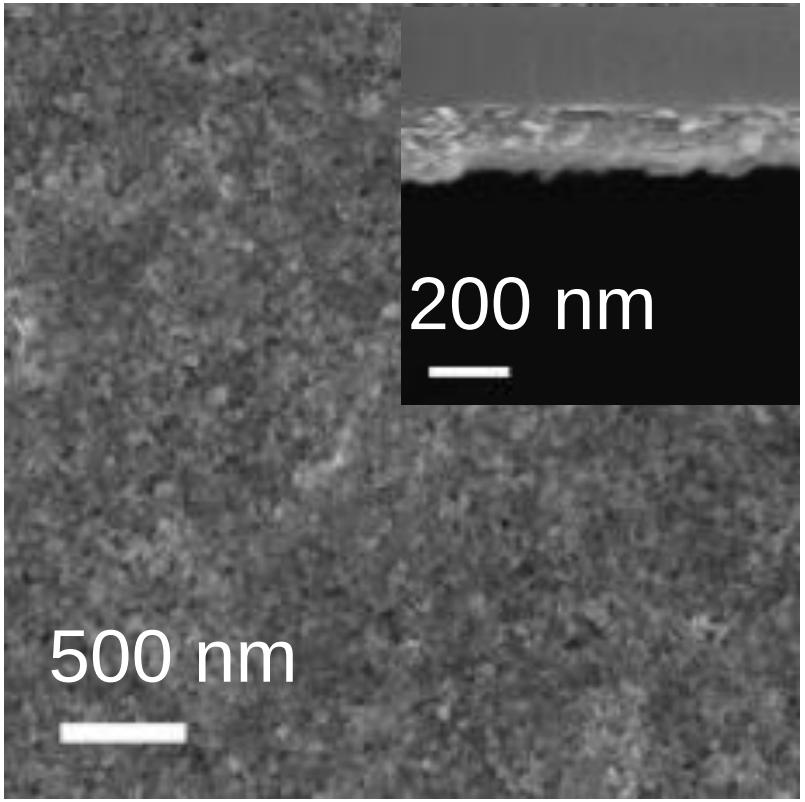


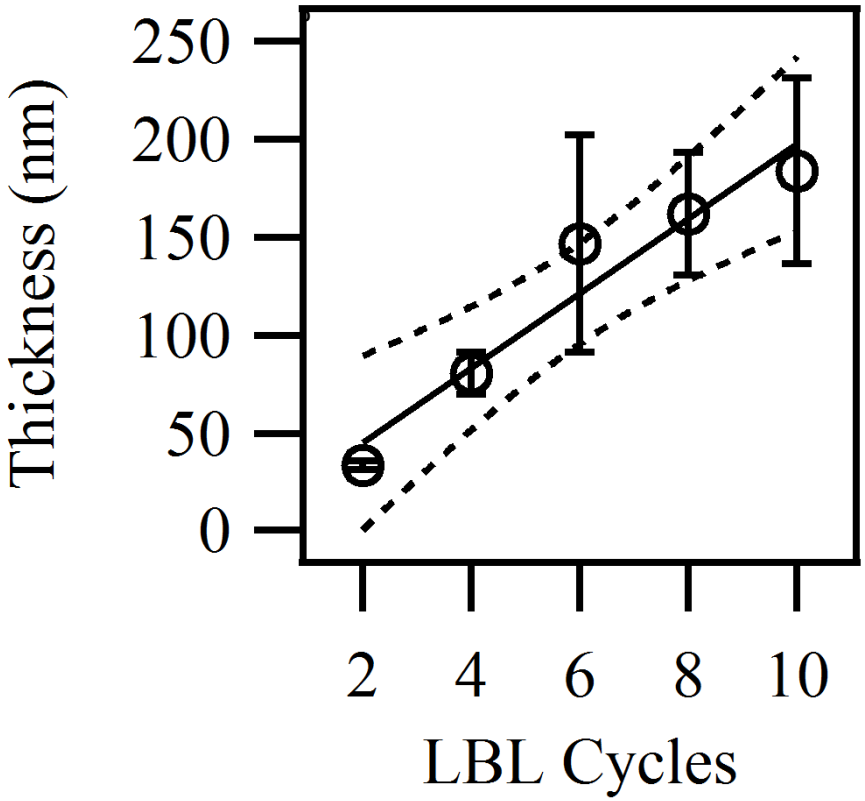
Formation of γ-Al_2O_3 after Annealing



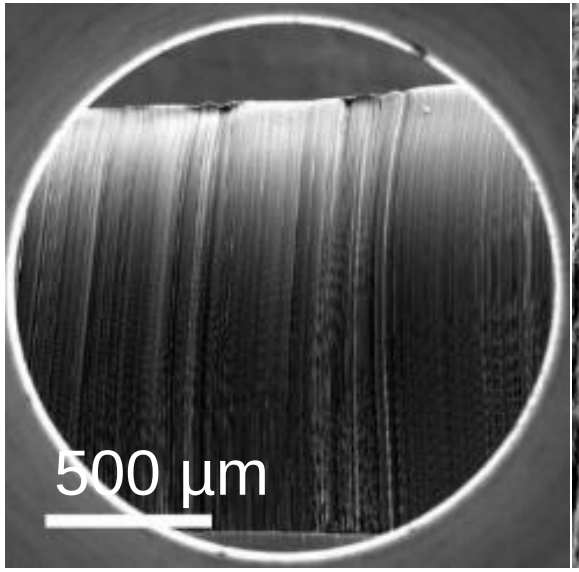


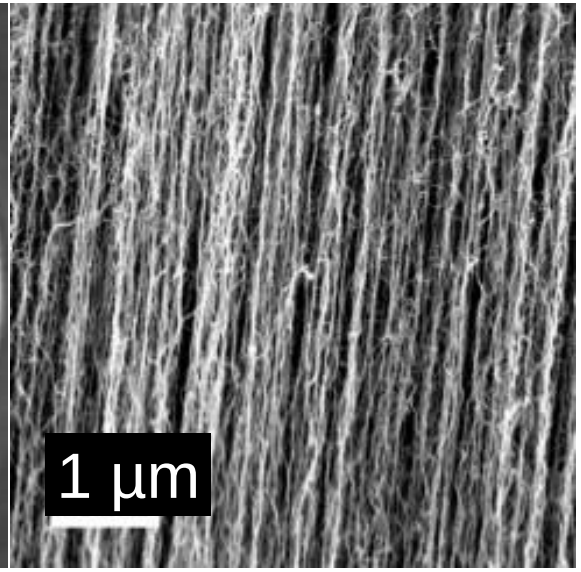
Control of γ-Al_2O_3 Buffer Thickness

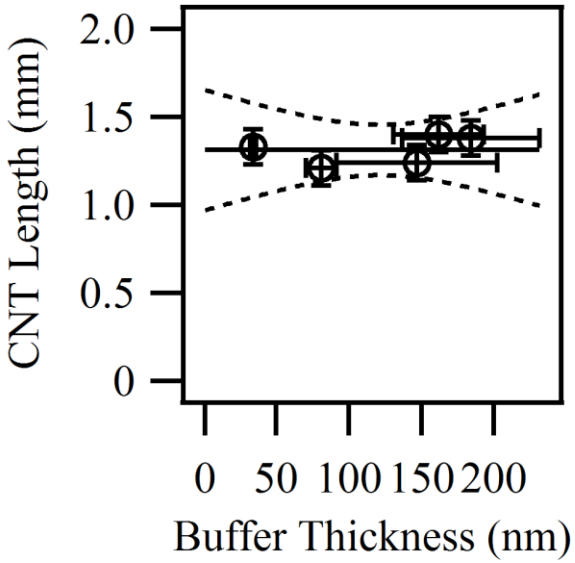


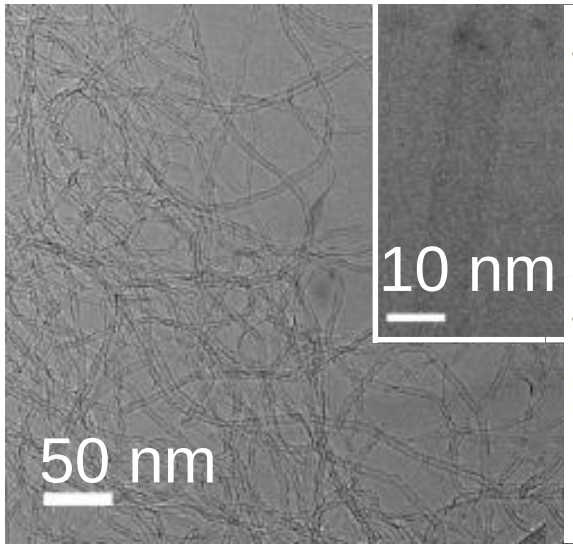


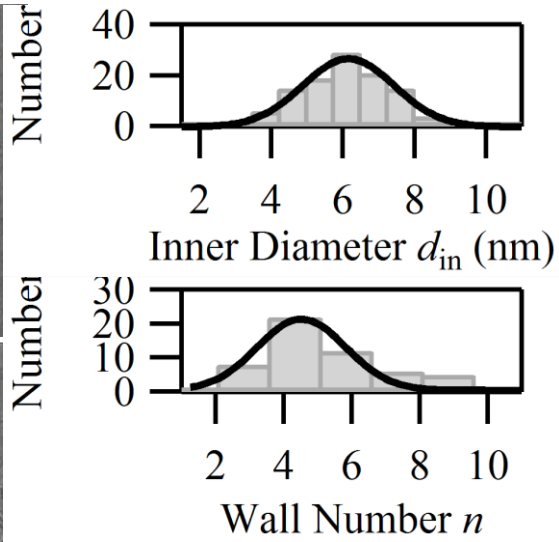
CNT Arrays More Than 1 mm Long



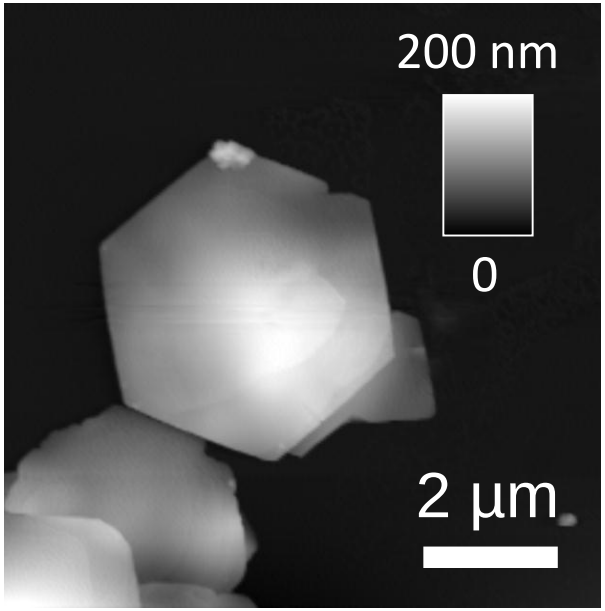


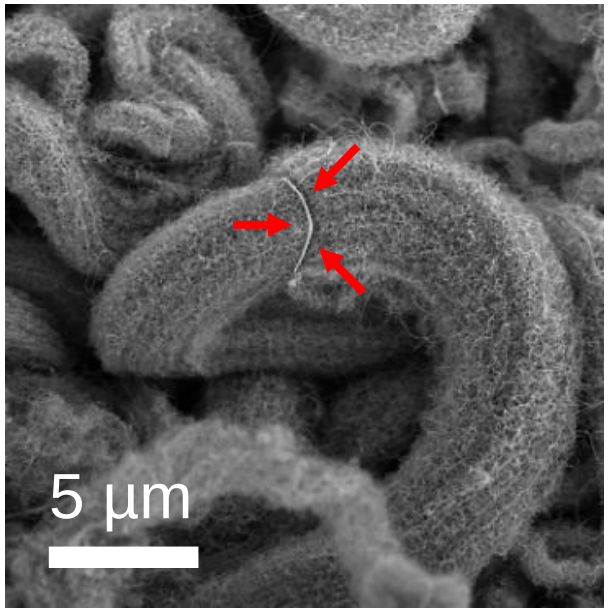


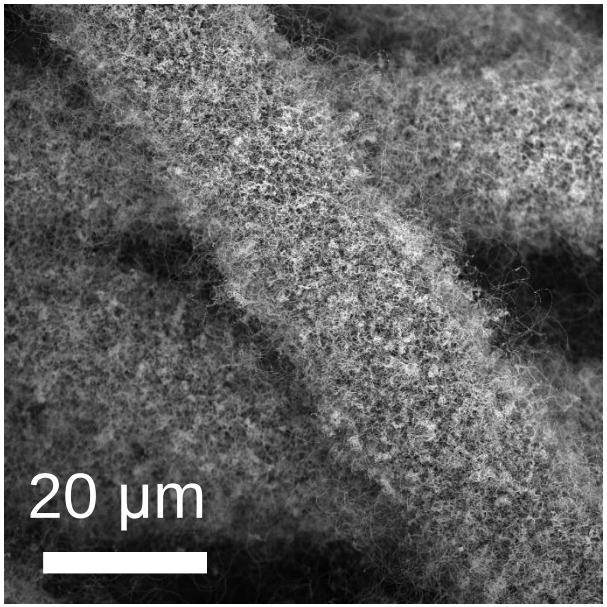




Mineral Nanoplates Serve as Both Buffer and Catalyst for Growing CNT Arrays







Summary

Mineral nanoplates are reliable and versatile precursors for preparing substrates to be used for synthesizing carbon nanotube arrays.

Substrate preparation using mineral nanoplates are scalable, energy-conservative, rapid, and simple.

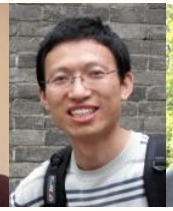
More Info: *Carbon*, 2014, 66:727-729.

University of Notre Dame
Civil Engineering and Geological Sciences

Alumni


Galyna Krylova


Haitao Wang


Yong Wang


Zhuxin Dong


Ming Li

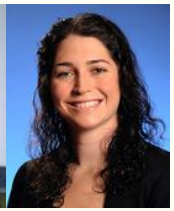

Hanyu Ma


Tong Wu


Xia Zhao


Guojing Liu


Andrew Lin


Marjorie Willner

Collaborators

Research Centers & User Facilities

cSEND
CENTER FOR SUSTAINABLE ENERGY AT NOTRE DAME

Center for Environmental Science & Technology at the University of Notre Dame

EFRC
Materials Science of Actinides

University of Notre Dame NDIIF

Midwest Isotope and Trace Element Research Analytical Center
MITERAC

Advanced Photon Source
Argonne National Laboratory