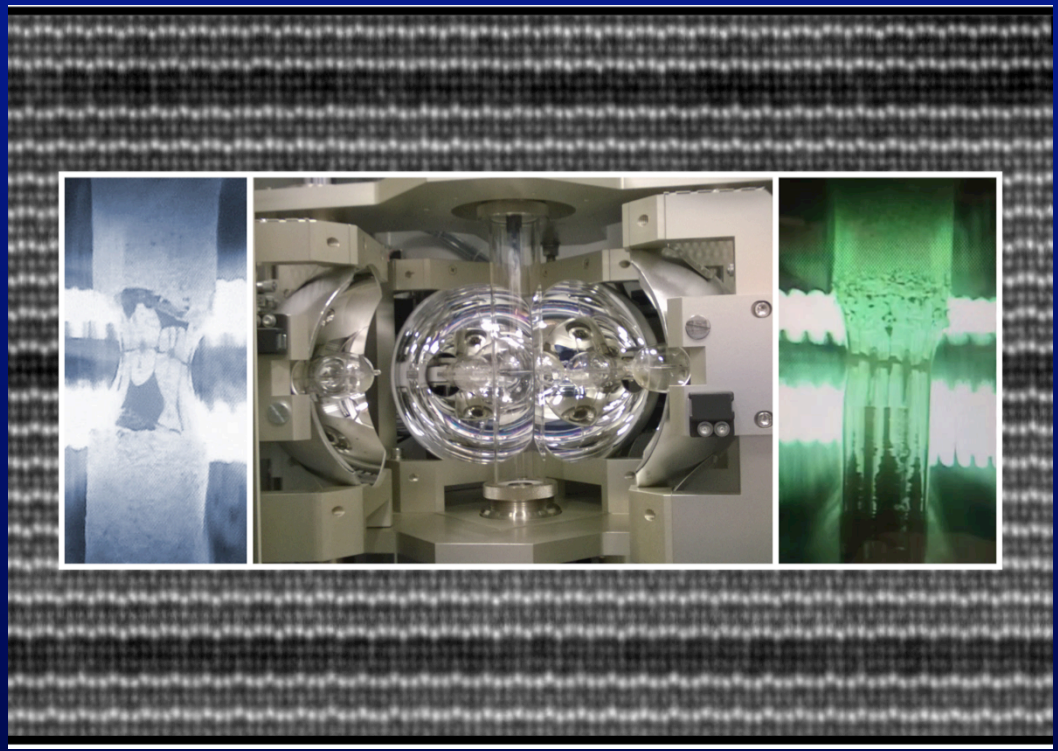
Materials-by-Design gets Serious!

PARADIM

PLATFORM FOR THE ACCELERATED REALIZATION, ANALYSIS & DISCOVERY OF INTERFACE MATERIALS



New $25 Million National User Facility dedicated to Electronic Materials — *by Design!*

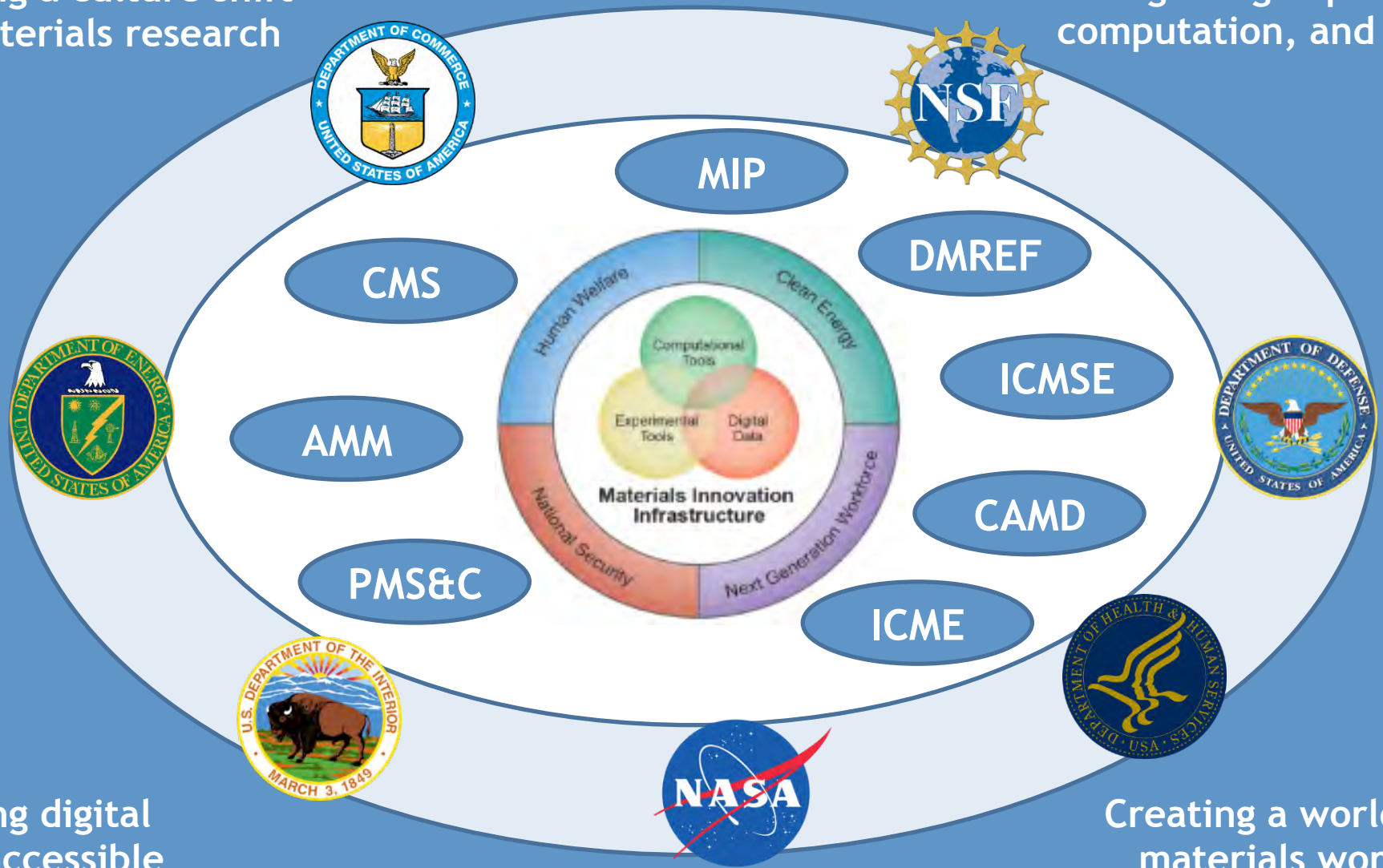
FREE!

www.paradim.org

Materials Genome Initiative

Leading a culture shift in materials research

Integrating experiment, computation, and theory



Making digital data accessible

Creating a world-class materials workforce

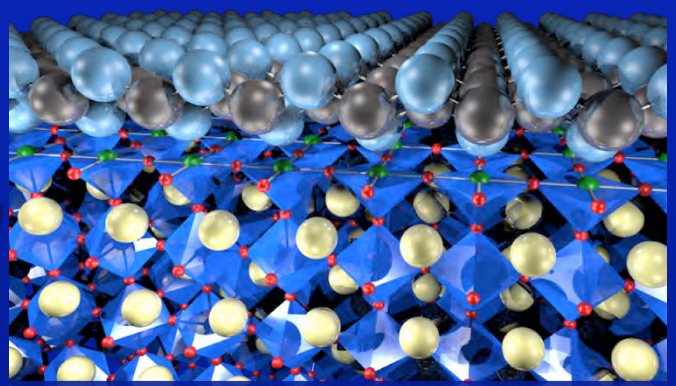
Credit: Chuck Ward (AFRL)

Enabling the discovery, development, manufacturing, and deployment of advanced materials at least twice as fast as possible today, at a fraction of the cost.

Bulk

PARADIM

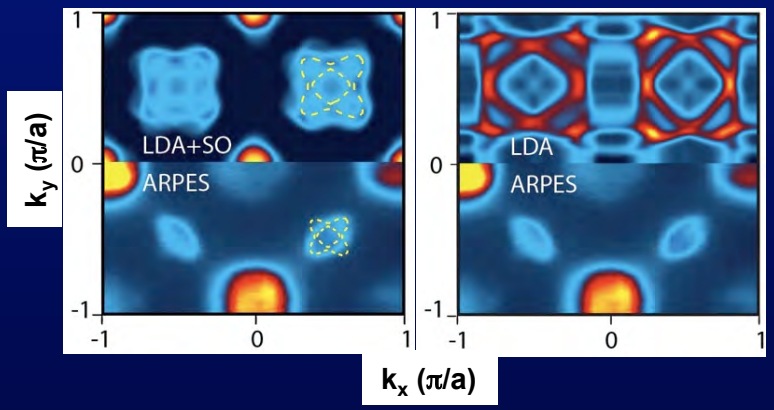
National User Facility dedicated to Electronic Materials — by Design!



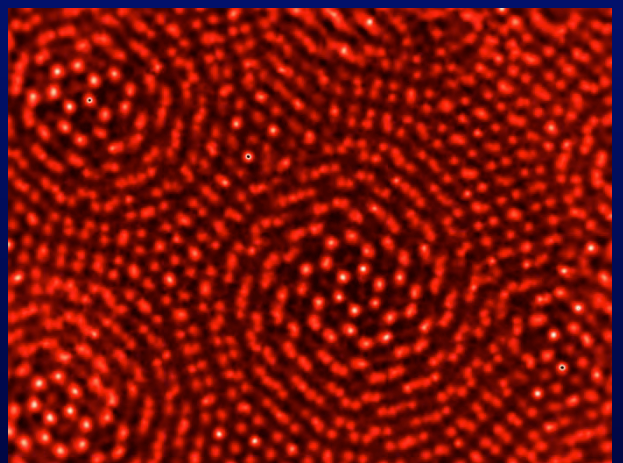
Thin Film

New Chemistry
New Physics
New Materials Science
New Materials

Theory & Computation



Electron Microscopy Characterization




PARADIM
An NSF Materials Innovation Platform

PARADIM Mission

*to empower practitioners to **accelerate** the discovery of atomically engineered inorganic materials that revolutionize electronics*

- **Educate and Inform Practitioners**
  - Free week-long summer schools (2 each summer)
  - Record and post in PARADIM's Materials-by-Design Toolbox
  - Organize sessions on materials-by-design at conferences
- **Enable Practitioners to Create the Materials they Envision in PARADIM User Facilities**
- **Discover Interface Quantum Materials for Next-Generation Technologies (in-house research)**
- **Collect, Curate, and Make Available all PARADIM Data**
- **Provide Samples of Materials Discovered in PARADIM**

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PARADIM's Unique Capabilities

PARADIM has the most advanced and complete set of openly available equipment and expertise in the world for the discovery of inorganic materials

- Floating Zone in supercritical fluid of oxygen and other gases (≤300 bar)—1st in world
- Floating Zone combining laser diode heating with real-time control of laser positioning—1st in world
- Fully automated MBE where users select among 62 elements (the most of any MBE system in the world)
- MOCVD of single-monolayer-thick TMD films on wafers over 3" in diameter (clones of 1st in world)
- STEM at room and LN_2 temperatures (and in-between) at highest resolution in world

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Types of PARADIM Proposals

- **Facility Access Proposals**
  - 2-page proposal for time allocation in PARADIM and related user facilities
  - Proposal good for up to one year or until the resource commitment is exhausted
  - Facility use is FREE to U.S.A. academic and national lab users, but their data and synthesis recipes become public
  - All samples produced belong to the user
  - **Data and recipes from industrial users *never* made public**
- **Material Only Proposals**
  - "New" interface materials discovered previously in PARADIM user facilities
  - Samples will be prepared by PARADIM interns using the optimized established synthesis recipe and mailed to users

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Data Management and Sharing

PARADIM Principles

- **All samples produced in PARADIM belong to the user**
  - Users are encouraged to share available samples in response to requests, but that decision lies entirely with the user
- **All data collected in PARADIM user facilities is tagged to the associated user proposal**
  - This data will become publically accessible after publication or 1 year of inactivity on a project (user can petition for longer period)
  - Users are expected to submit their publication-worthy results in a timely manner to journals
  - Exception—Data from industrial users never made public
- **PARADIM interns (REU students) utilize optimized recipes to fulfill sample requests**

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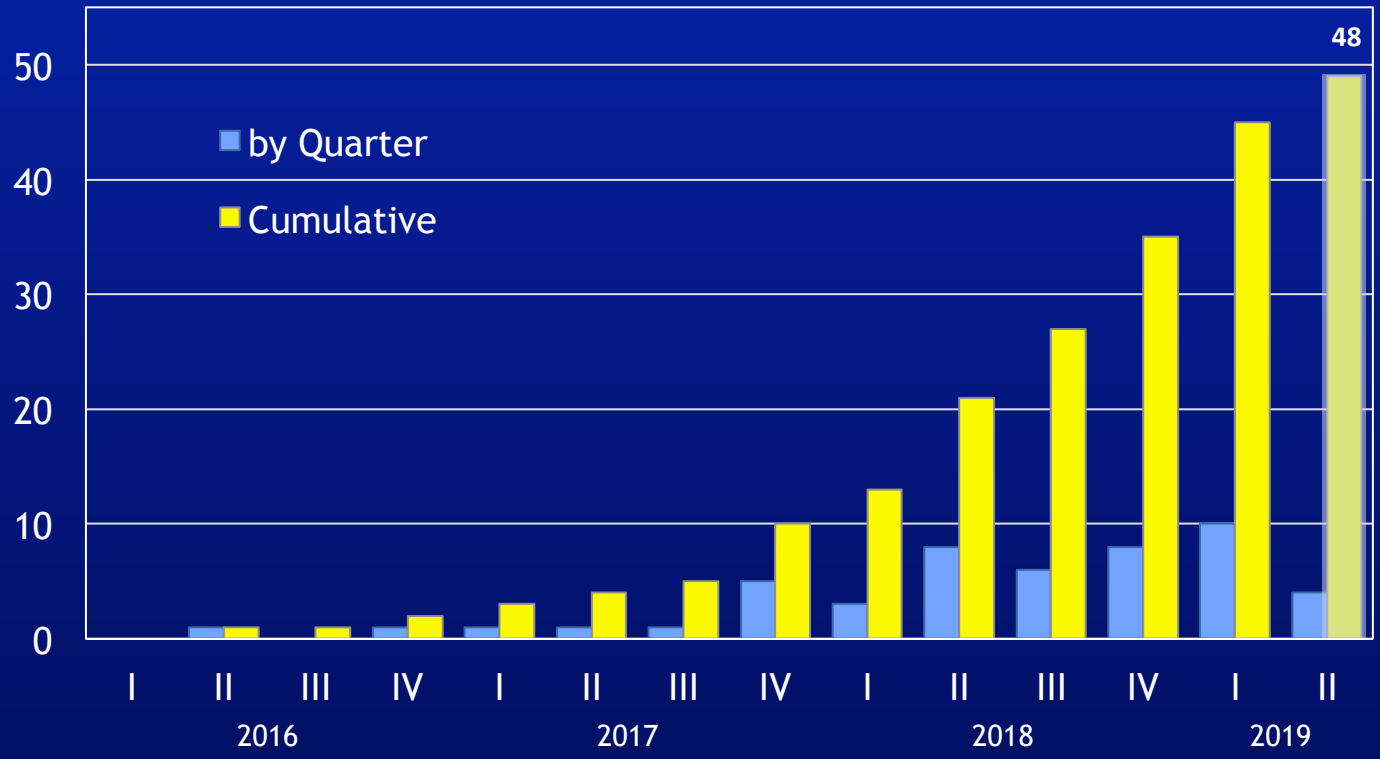
Publications from PARADIM Users



48 PARADIM publications to date

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PARADIM
AN NSF MATERIALS INNOVATION PLATFORM

Platform

MIP

User Program

In-House Research

Platform: a mini ecosystem where researchers interact, learn & share knowledge, & collaborate – **via instrument/facility; user training; sample, code & data sharing, ...**