Convergence of SynBio Tools with the Materials Genome Initiative

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Where Materials Begin & Society Benefits!
A MULTI-AGENCY PARTNERSHIP

Discovery
Development
Property optimization
system design and integrations
Certification
Manufacturing
Deployment

NSF - MPS
ENG
DOD
NIST
DOE-BES
DOE-EERE

NSF/DOE sponsored PI workshops for MGI-supported research each year

DoD
Industry
You
DoE
NSF
NIST

Graphic: Number of New Materials to Market vs. Future Materials Continuum

Materials Continuum Today

Time
President announces Materials Genome Initiative

Materials Project (DOE/BES)

Designing Materials to Revolutionize & Engineer our Future (DMREF) (NSF)

Materials Data Repository (MDR) (NIST)

Center of Excellence in MGI Approaches (NIST)

Materials Genome Initiative Strategic Plan

Computational Materials Science (DOE/BES)

Energy Materials Network (EMN) (DOE/EERE)

MaterialsLab (NASA/NIST)

Materials Innovation Platforms (MIPs) (NSF)

Materials Resource Registry (MRR) (NIST)

Materials Curation System (MCS) (NIST)

Materials Science & Engineering Data Challenge (AFRL, NIST, NSF)

See mgi.gov for full list

• MGI PI meetings
• Award Supplements
• Joint Workshops
• Joint Summer Schools
• Funded Studies
New frontiers for the materials genome initiative

Report due November 2019
“Converge” these Research Approach Paradigms

MGI

SYNBIO

Design → Build
Learn ← Test

SQUARE TABLE

Discovery ↔ Develop
Decommission (Degrade) ↔ Deploy
Square-Table Concept

Synth-Bio-Mat Convergence

BioMaterials Community

Industry Rep / Federal Regulators (FDA, EPA)

Funding Agencies (NSF, NIH, NASA, DoD, DARPA, etc)

Synthetic Biology Community
OPPORTUNITIES TO COLLABORATE IN THE NEAR-TERM

Inaugural meeting: Square-Table: Living Interfaces (ST1-2018)
2-3 December 2018 in DC, involved 30 PIs from synbio and biomaterials that included about 30 program directors from across NSF, including PDs from NIH, NIST, FDA, NASA, DARPA, and AFOSR. *Whitepapers were invited, about 10 were submitted, and are being internally reviewed with 1-2 to be invited for EAGERs.*

Upcoming: Square-Table: Programmable Interfaces (ST2-2019) planned for late August 2019 in DC
Expanded in number to about 60-70 PIs. Significant international participation is planned. The theme will focus on interfaces that can be controlled in real-time in terms of mechanical properties, permeability, and biocompatibility.

Upcoming: Square-Table: Networking (ST3-2019) planned for late November 2019 at the UPenn MRSEC
Will bring together the existing major efforts (Centers and institutes) supported across NSF to develop Research Collaborative Networks (RCNs). The chair will be Daniel Hammer at UPenn and will include significant international participation.
Back-up slides
Materials Innovation Platforms (MIP)

Chalcogenide 2D materials with a focus on providing new bulk crystal chalcogenides and improving existing and new 2D chalcogenide thin films for electronic applications.

https://www.mri.psu.edu/mip

Oxide-based hetero-interfaces with a range of 2D material systems such as oxides, chalcogenides and graphene for novel electronic and magnetic functionality.

http://paradim.cornell.edu/

From the MPS AC Report: Closing the Loop Materials Instrumentation
Materials Innovation Platforms (MIP)

**MIP Concept:** Combine a focused research effort in an interactive feedback loop together with a mid-scale user facility open to the community in order to accelerate advancement of a materials research topic of national importance.

**Focus:** advancing convergence of materials research with biological sciences for developing new materials.

Also see 2016 Biomaterials Midscale Tools Workshop Report at www.biomatworkshop.org

Postponed to April 26, 2019