

Research Community: *Understanding Rules of Life (RoL)*

NSF Definition OF Rules of Life (RoL)

Research Driven by Design and Construction of new Biological devices and systems that do not exist in the Natural World

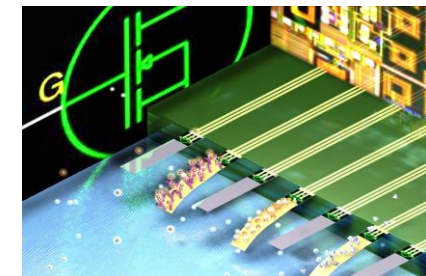
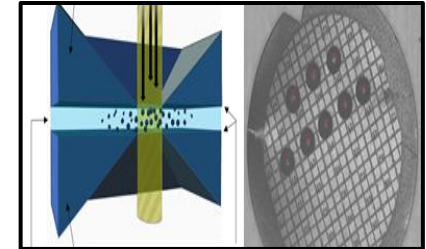
General Principles (rules) that underlie biological phenomena within or across scales of size, complexity (e.g., molecular, cellular, organismal, population) and time.

Representative SHyNE Thrust Areas

- **DNA Nanotechnology:** *Diagnostics/therapy, materials..*
 - **Synthetic Biology:** *Cell and Cell-Free systems (CFS)*
 - **Regenerative Medicine, Flexible/Bio-Electronics**
 - **“Imaging” of Life:**
 - *from Atoms to Animals and Molecule to Mice!*
 - **Cross- and Multi-disciplinary convergence:** *Nano-Bio integration and coordination; across topics, sites, ...*
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- ➔ *Innovative and interdisciplinary research across SHyNE*
 - ➔ *Better and improved research tools, infrastructure and collaborative culture*
 - ➔ *Multidisciplinary and “immersion/experiential” education and workforce training.*
 - ➔ *Regional/Local Outreach – Museums and local partners*
 - ➔ *Entrepreneurship and innovation at soft/hard interfaces*

Facilities/Infrastructure Needs for RoL

- ✓ **Instrumentation & methods** for static, dynamic and multimodal coordinated characterization of the building blocks of life
- ✓ **Multi-faceted and diverse** approaches across length-scales to provide insight into every phase of (life) processes and their implications
- ✓ **Multidisciplinary and cross-disciplinary implications** across a whole gamut of technical fields: Ag, food, water, environment; sustainability..
- ✓ **Education, HR and training in RoL** – education, workforce and staff training in the broad area of rules of life
- ✓ **Novel and innovative “Broader Impact”** in understanding the dynamic and changing biological systems



Planning for RoL

Local/Regional Network Coordination

- ✓ iNano- UC, ANL, NU under SHyNE + Chicago Biomed Consortium (CBC)
- ✓ Art Inst. Chicago, CMSI, Field Museum, CBG
- ✓ Regional Networking and Partnerships
- ✓ UC Innovation Exchange (CIE) and Illinois Science + Tech Park
- ✓ Ongoing dialogue - Industry and National Laboratories (Argonne, Fermi)

Potential Activities/Example

- ID site-specific group for “*Understanding Rule of Life*” related development/solutions
- Compile and Coordinate RoL thrust areas across NNCI
- Initiate topics and timeline: Workshop, symposia, thematic topics...
- Website/Portal providing ready access to information and links
- Roadmap for RoL - specific focus themes: e.g., SynBio, Personalized medicine, Diagnostics/sensing, therapeutics

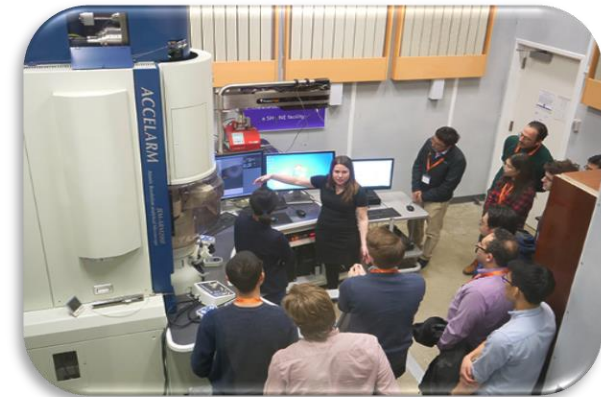
RoL - Opportunities in Broader Impact

Goals

- ✓ Bring together researchers from diverse disciplines and facilitate collaboration across network sites and beyond in RoL
- ✓ NNCI open-access facilities in RoL themes
- ✓ Innovations in Outreach and Education
- ✓ Road-mapping across technical themes
- ✓ Workforce development, continuing education, regional govt and agencies

Broader and Educational Outreach

- Integrative and Comprehensive Approach
- Expanding REU and RET Programs within Network with focus on *Rules of Life*
- Regional Coordination (e.g., iNANO) and Regional Communities
- Rules for Life exhibits at museums?
- Nano-Journalism
 - *Experiential learning for students in Rules of life*
- Web Portal, Tech Talks, Webinars, Short courses and Workshops



Open Discussion

Q & A

(Dedicated portal for RCs/RoL)