NSLS and NSLS-II

General Information – NSLS

NSLS – Outstanding Scientific User Facility







55 Beamlines in FY14

X-ray Ring: 2.8 GeV 300 mA VUV Ring: 0.8 GeV 1000 mA ~5,000 hrs of user operations each year

User operations: started 1982

Operations Budget: \$33M

2367 unique visiting users in FY2013

FY14 Publications: 973

Premier: 197 (~20%)

~900 publications/year

Staff Pubs



NSLS Tradition and Strengths: Broad range of science programs Diverse capabilities over broad spectral range Highly engaged and productive user community

Highly Productive & High Impact Since 1982 2,367 57,000 Publications 17,182 881





Science

Crucial Resource

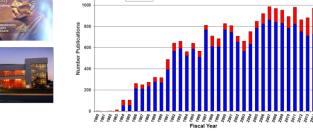
Protein Databank Deposits

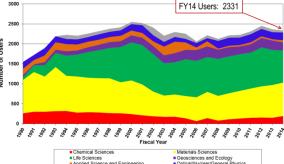
2 Nobel Prizes (2003, 2009)

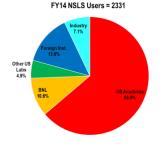
Universities: SBU, Columbia, MIT, Yale, Rutgers, ...

 Industry: IBM, ExxonMobil, GE, Pharmaceuticals, ... · BNL: CFN, CMP, Catalysis, Struct Bio, Env Sci,

~ 600







FY14 NSLS User Institutions = 402 US Govt Labs 5.5%

Societal Impact - Over 100 Companies Have Conducted Research & Development at NSLS



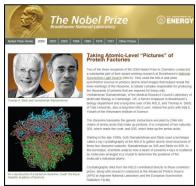
Work Conducted at NSLS Supports a Wide Range of **Private Sectors Today**

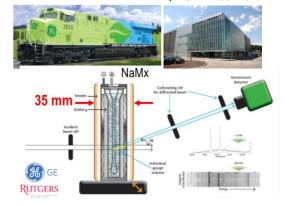
· Majority of industrial research is on basic material structures at the molecular and atomic levels

- Petrochemicals - Polymers
- Catalysts
- Pharmaceudicals
- Significant work on in-situ systems engineering and prototype manufacturing processes
 - Thermal annealing
 - Purification
 - Battery cycling Mechanical stress tests

GE DURATHON MANUFACTURING Schenectady, NY, \$170M investment





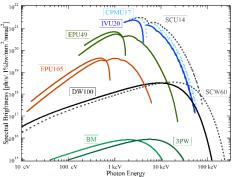


NSLS and NSLS-II

New Facility: NSLS-II



User operations: starts 2015 NSLS-II Storage Ring: 3 GeV 500 mA Emittance: ε_x , ε_y = 0.6, 0.008 nm-rad Number of Beamlines: >60 beamlines ~5,000 hrs of user operations each year ~4000 unique visiting users each year



8 NSLS-II Project Beamlines

Inelastic X-ray Scattering (IXS)
Hard X-ray Nanoprobe (HXN)
Coherent Hard X-ray Scattering (CHX)
Coherent Soft X-ray Scat & Pol (CSX1, CSX2)
Sub-micron Res X-ray Spec (SRX)
X-ray Powder Diffraction (XPD1, XPD2)

6 NEXT Beamlines (DOE MIE)

Photoemission-Microscopy Facility (ESM) Full-field X-ray Imaging (FXI) In-Situ & Resonant X-Ray Studies (ISR) Inner Shell Spectroscopy (ISS) Soft Inelastic X-ray Scattering (SIX) Soft Matter Interfaces (SMI)

3 ABBIX Beamlines (NIH)

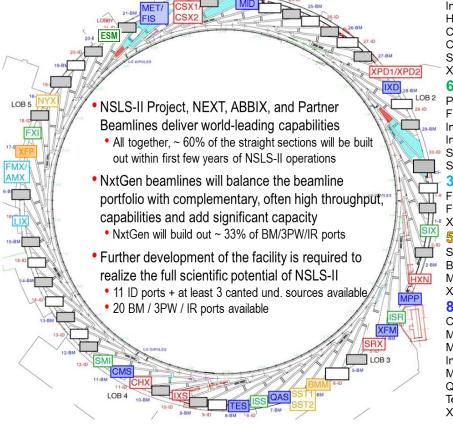
Frontier Macromolecular Cryst (FMX) Flexible Access Macromolecular Cryst (AMX) X-ray Scattering for Biology (LIX)

5 Partner Beamlines

Spectroscopy Soft and Tender (SST1, SST2) Beamline for Mater. Measurements (BMM) Microdiffraction Beamline (NYX) X-ray Footprinting (XFP)

8 NxtGen Beamlines

Complex Materials Scattering (CMS)
Magneto, Ellipso, High Pressure IR (MET/FIS)
Metrology & Instrum Development (MID)
In-situ X-ray Diffraction Studies (IXD)
Materials Physics & Processing (MPP)
Quick X-ray Absorption and Scattering (QAS)
Tender X-ray Absorption Spectroscopy (TES)
X-ray Fluorescence Microscopy (XFM)



FY13	FY14	FY15	FY16	FY17	FY18	FY19
NSLS-II Project Beamlines						
ABBIX Beamlines						
NEXT Beamlines						
NxtGen & Partner Beamlines						

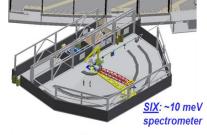
NSLS and NSLS-II

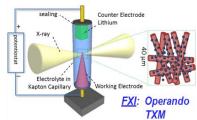
Future Prospects

- Complexity and Dynamics:
 - <u>Strategic Objective 1</u>: NSLS-II will develop world-leading highspatial-resolution nanoprobe, high-coherent-flux coherent scattering, and high-energy-resolution inelastic scattering capabilities to meet the research needs

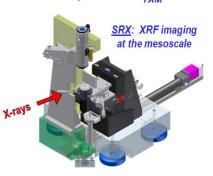


 <u>Strategic Objective 2</u>: NSLS-II will leverage its strengths and the existing expertise in the scientific and industrial community to develop novel and world-class in-situ and in-operando capabilities to meet the research needs on functional systems





- Mesoscale & Multiscale Science:
 - <u>Strategic Objective 3</u>: NSLS-II will develop a set of mostadvanced, correlative, multi-scale structural and chemical imaging capabilities as well as theoretical and modelling tools to meet the research needs in mesoscale and multiscale sciences.



Science Portfolio at NSLS-II



Emergent Behavior from Complexity



Mastering Materials
Discovery &
Processing



Catalysis and Energy Science



Environment and Climate Science



Structures and Functions of Life

