

• SURFACE  
• SCIENCE  
• WESTERN



ISO 9001:2015



Western

Dr. Mark C. Biesinger  
Manager,  
Research and Business Development



*A Consulting And Research Laboratory Specializing In The  
Analysis And Characterization Of Surfaces And Materials*

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## Surface Science Western (SSW)

Since its inception in 1981, SSW has successfully served a number of high profile clients across a range of industry sectors including: energy, mineral resources, health services, automotive, aerospace, environmental, electronics and plastics. In servicing a vast range of these clients, from small manufacturing facilities to industrial giants, SSW has garnered a solid reputation for quality, innovation and timely service. [click here to learn more](#)

[ANALYSIS REQUEST](#)

### Exceptional Service

With over 250 people-years of experience and unparalleled interpretive skills, our

### Industrial Solutions

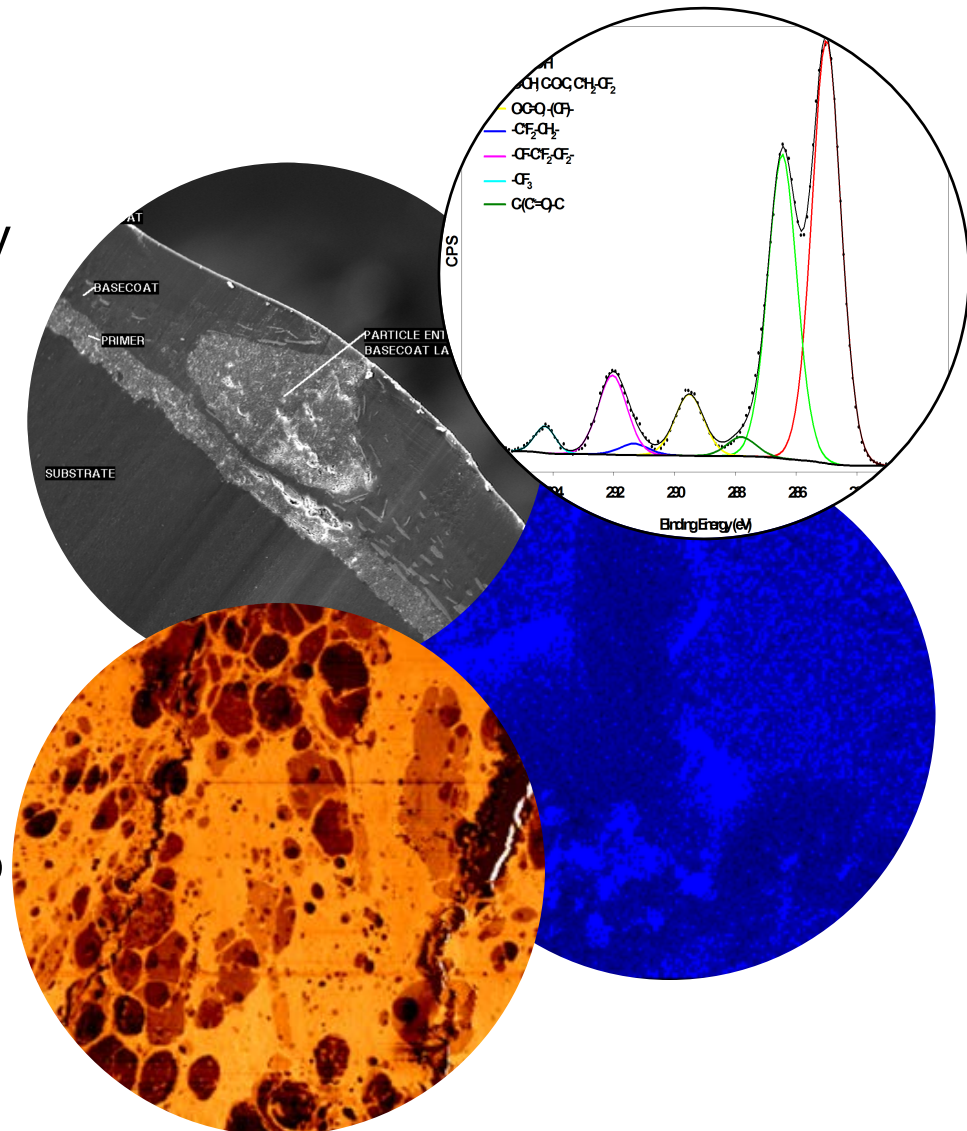
SSW has a long history of service that has allowed it to develop a high level of expertise

### Analytical Services

SSW offers clients a range of high quality services and cost-effective access to the

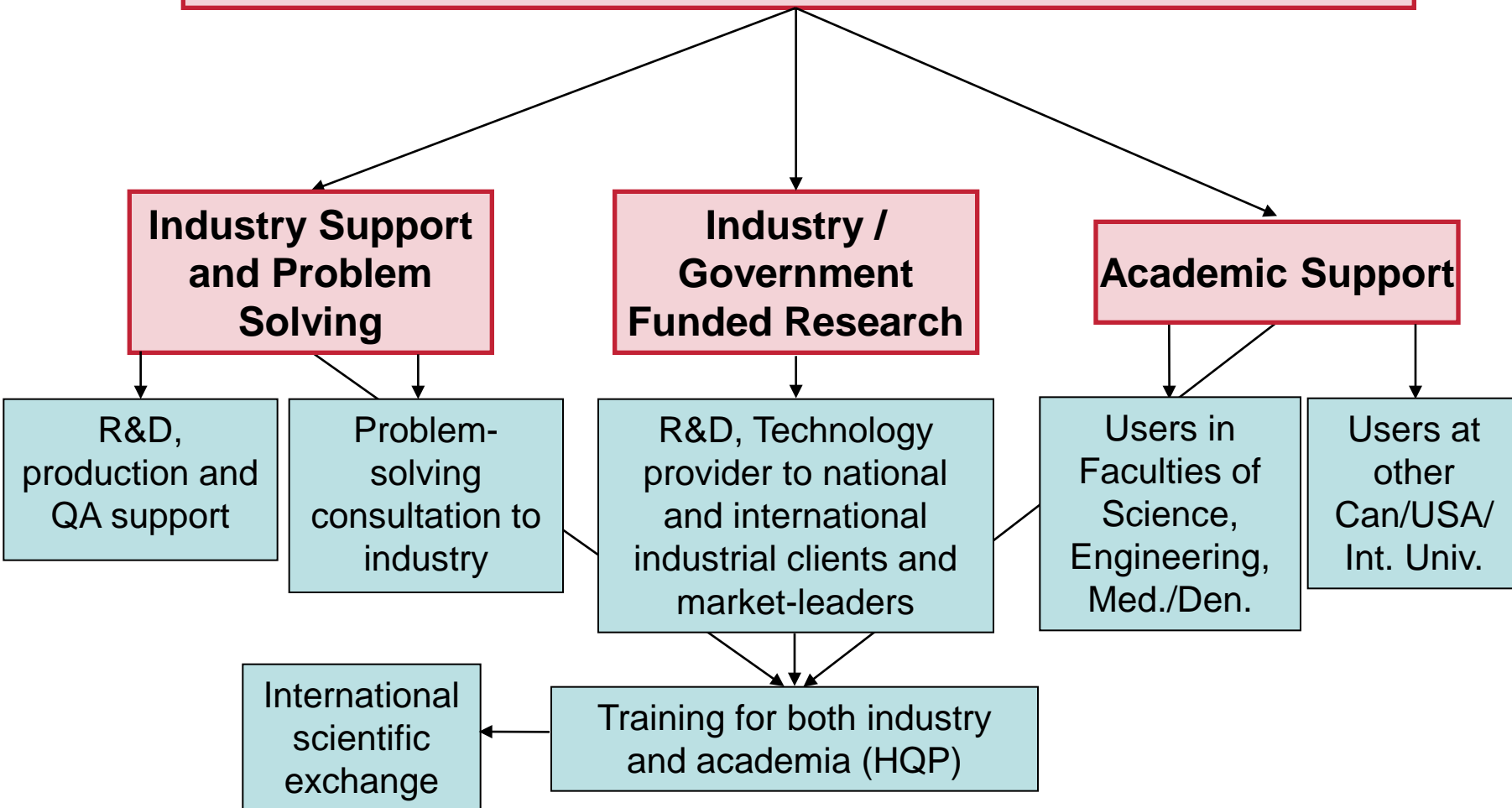
# About Us

- 16 full time staff scientists and administration members
- Expertise in chemistry, geology, engineering, physics, metallurgy and material science.
- Over 300 people-years of experience in surface analysis.
- Opened 1981.
- Over 200 publications authored /co-authored by staff in the field of materials and surface analysis in the last 10 years
- A number of staff members also hold adjunct professor status and manage their own groups
- Self Sustaining Ancillary Business Unit



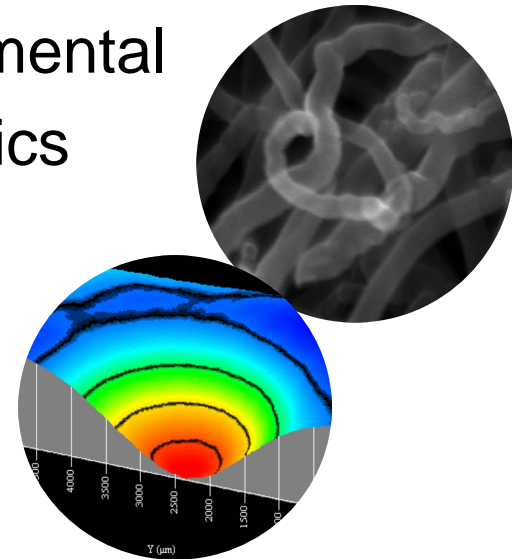
# Funding Model: Revenue

## Surface Science Western – Leader in University – Industry Collaboration



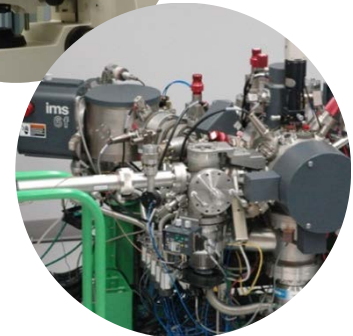
# Industry Sectors

- Work with ~ 180 different companies from across North America annually
- Over 1000 technical reports per year
- Small local firms to huge multinational companies
- ISO 9001-2008 registered since 2006, Now ISO 9001-2015
- Moving to ISO 17025
- Automotive
- Aerospace
- Defence
- Mineral Resources
- Energy and Nuclear
- Medical/Health
- Environmental
- Electronics

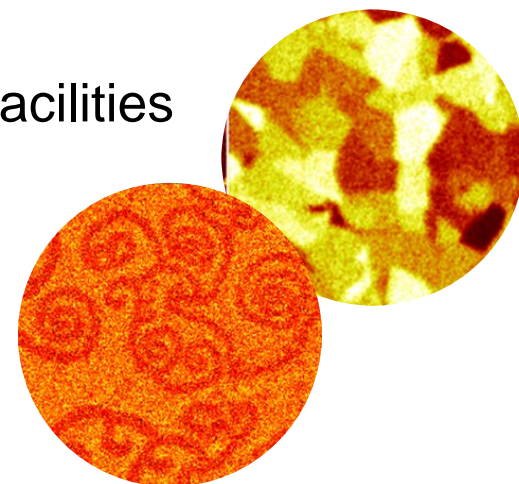
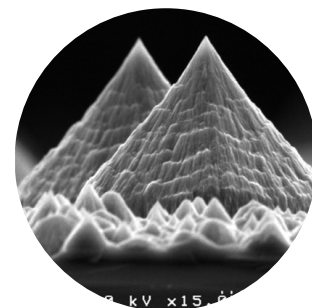


# Instrumentation

- Optical Microscopy
- Scanning Electron Microscopy (SEM)
- Field Emission Scanning Electron Microscopy (FESEM)
- Energy Dispersive X-ray Spectroscopy (EDX)
- Dynamic Secondary Ion Mass Spectrometry (SIMS)
- Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS)
- X-ray Photoelectron Spectroscopy (XPS)
- Scanning Auger Microscopy/Auger Electron Spectroscopy (SAM/AES)
- Laser Raman Spectroscopy
- Fourier Transform Infrared Spectroscopy (FTIR)
- Surface Profilometry
- Contact Angle Goniometer
- Atomic Force Microscopy (AFM)
- Microindentation Hardness Testing
- Metallographic Preparation and Cross-Sectioning Facilities
- Specialized Surface Preparation Chambers
- Corrosion and Electrochemical Testing Facilities



- XPS
- UHR-FESEM with standard EDX, low Voltage EDX, STEM
- FE-Scanning Auger Microprobe
- Micro Computed Tomography (Micro-CT)
- Laser Confocal Microscope for Materials
- X-ray Diffractometer/Reflectometer
- Slow Strain Rate Tester (SSRT/CERT)
- Mechanical Testing Stages for the existing FESEM/EBSD and Micro-CT
- Humidity, Weathering, Xenon Arc, Cyclic Corrosion Chambers - Options for standardized (ASTM) type testing
- Automated Contact Angle Goniometer
- Additional Corrosion and Electrochemical Testing Facilities
- Argon Ion Milling Station
- High Resolution Ir Sputter Coater
- Inert Atmosphere Glove Box



# Instrumentation – Advanced Manufacturing Consortium Project

- Digital microscope
- Surface Profilometer
- Metallurgical Cut-off Saw
- Major Upgrade to TOF-SIMS
- Upgrade to metallurgical microscopes
- Large Chamber SEM/EDX ...summer '19
- Thermogravimetric Analyser (TGA) ...winter '19
- Differential Scanning Colorimeter (DSC) ...winter '19
- Rockwell Hardness Testing ...summer '20
- Micronizer (for quantitative powder XRD) ...fall '20
- Microtome (for materials preparation) ...fall '20



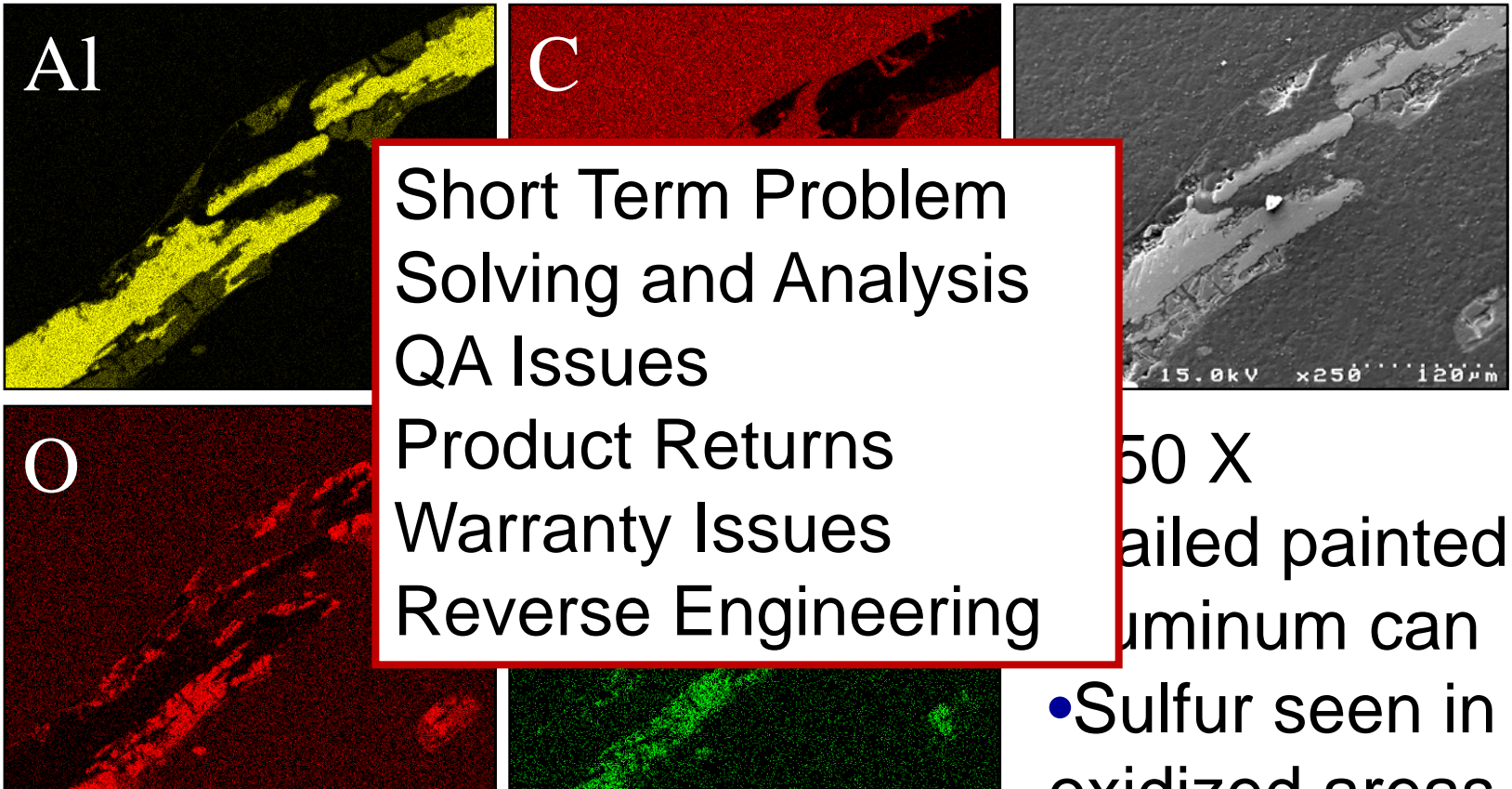
**Advanced  
Manufacturing  
Consortium**



# Why Do Surface Analysis?

- The following are some of the areas/applications can benefit from surface analysis:
  - Coatings/plating (paint, polymers, metals, ceramics)
  - Contamination problems (dust, dirt, residues etc.)
  - Adhesion issues (coating failures)
  - Understanding corrosion issues (deposit chemistry, thin films)
  - Surface modification evaluation (chemical, physical)
  - Finding trace impurities in materials (grain boundary segregation, ion implants, buried interface issues)
  - Thin films / multilayered structures (from a few nanometers to a few microns in thickness)
  - Nanomaterials
  - Tribology / wear / fracture / failures of materials
  - Chemical/physical properties of materials
  - Metallurgy (alloy grain structure, hardness, film builds, corrosion attack)

# How SSW Works with Industry



EDX elemental maps of a cross-section of a failed area.

# Dewetting



defects on  
headlamp

ring  
contained Na, K, Ca, Cl,  
etc.

• Caused by impure rinse  
water

• Traced to a failed  
deionized water system

DEWET AREA

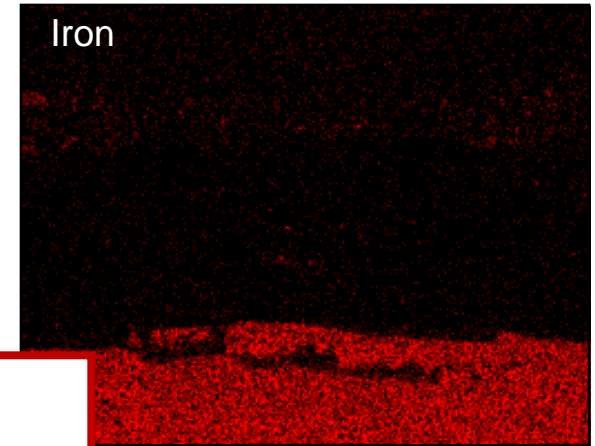
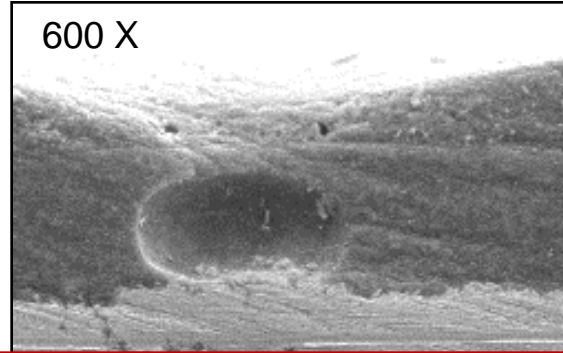
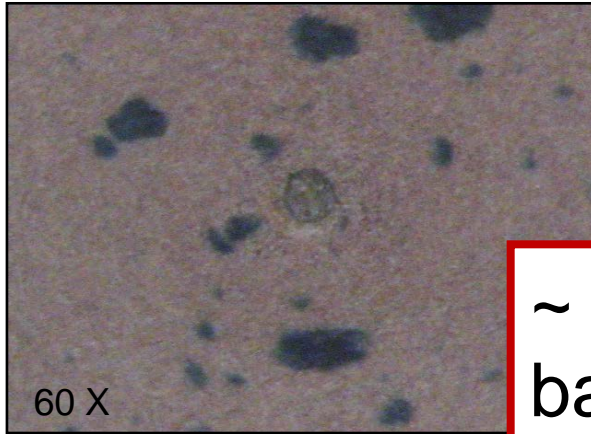
DEW

## Industry Needs Fast Turnaround Past 3 years

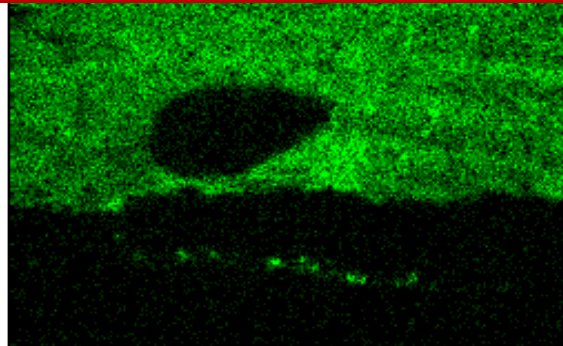
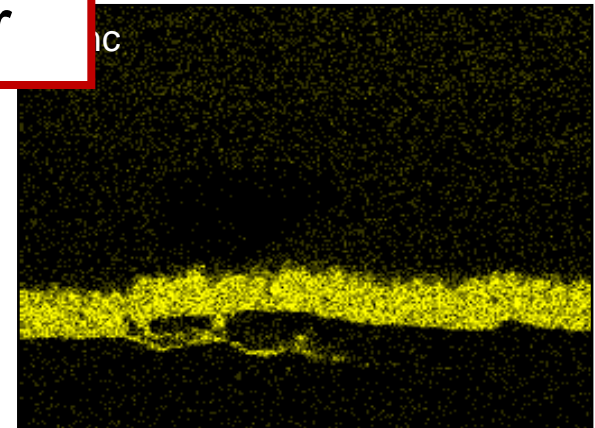
- 48 % of work has been expedited to some degree
- 17 % 1 Day Turnaround

15KV 152X 65.8µ 0000

# Pinholes in Paint Caused by Cracks in the Steel Substrate



~ \$500K in charge  
back to steel supplier



- Pinhole defects in a line on hood

- EDX mapping showing cracks in the steel

# Major Project Participants and Consultants

- Alcoa
  - Novelis
  - Chrysler
  - GM
  - Ford
  - Atlas
  - **Surface Science Western (UWO)**
- PPG
  - Henkel
  - Singleton Corp.
  - Partnering with Multiple Industries and/or Industrial Consortia to Solve Common Problems
  - Testing Technology
  - Testing (NET)
  - Quality Statistics
  - CorrPro Companies, Inc.

# Industry/Government Funding

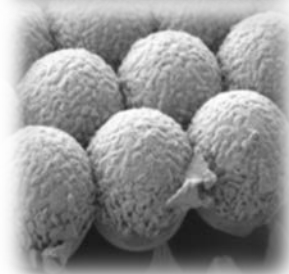
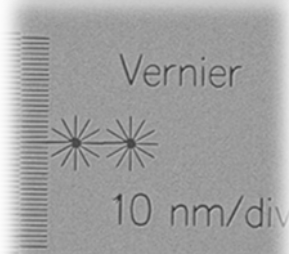
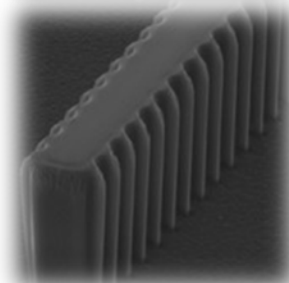
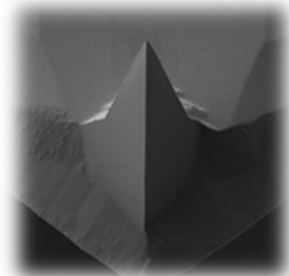
- Previously - NSERC Connect, Engage, CRD, Strategic
- Now all becoming NSERC Alliance Grants – phased in over next 1-2 years
- MITACS – internship and industrial PDF funding
- ORF – Research Excellence (RE) – up to \$4M matching funding
- OCE – Ontario Centres of Excellence – various programs
- IRAP – Industrial Research Assistance Program and BIAP – Business Innovation Access Program (NRC)
- More specific to industrial sectors...

# Western Nanofabrication Facility

WESTERN  
NANOFABRICATION  
FACILITY



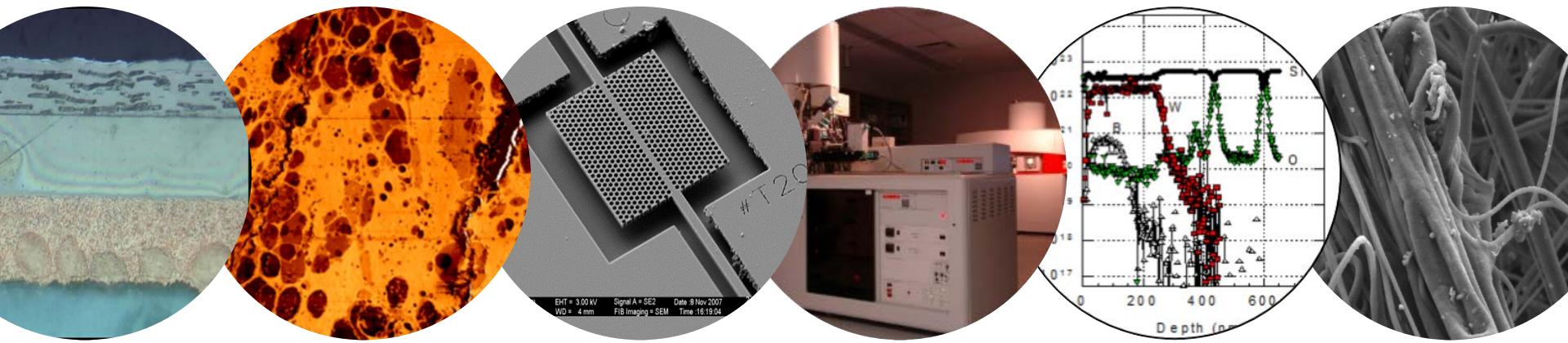
- Fabrication at the nano- and micro-scales, characterization, process development, fabrication of prototypes
  - 2500 ft<sup>2</sup> class 100, 1000 cleanroom
  - Lithography, E-beam lithography, Interference lithography
  - Etching/Deep reactive ion etching
  - Thin film deposition
  - Profilometry
  - Ellipsometry
  - Langmuir-Blodgett film preparation
  - Focused Ion Beam
  - FESEM/EDX, SEM/EDX
- Has developed into a facility to foster, support and sustain research in micro – and nanotechnology and applications in a variety of fields (biotech, photonics, sensing, transducers...).
- 2 full time staff members + Scientific director.







- **Materials is a key research area at Western**
  - \$58.6 million in funding (2012-17), 7 CRCs (+3 in progress), many industry partners, awards
- **CAMBR**
  - Comprised of ~ 50 research groups at Western
  - Mission - to bring together trainees, researchers, and partners, to connect them with the resources needed to tackle important multidisciplinary materials and biomaterials challenges, and to translate and promote our discoveries.
  - Objectives
    - i) Strategically connect teams of students, researchers, and partners, with the aim of promoting collaborations and building towards larger multidisciplinary projects
    - ii) Facilitate the acquisition and sharing of instrumentation
    - iii) Enhance the visibility of Western's Materials and Biomaterials research



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SSW tours start at 11:55 or come chat with us during the mini poster session at that time.

