

Artistic Microscopy

These are the winning entries for Artistic Microscopy in the International Metallographic Contest and Exhibit, which was held in conjunction with M&M 2010 and the 43rd IMS Annual Meeting in Portland, Oreg. Congratulations to the winners.

Class 9 (black & white)

1st Place Flowers (SEM)

Nat Saenz, James Coleman,
and Todd Schaefer

Pacific Northwest National Laboratory (PNNL)
Richland, Wash.



SEM microphotograph of corrosion products on X65 steel after 9 days exposure to liquid CO₂ (6.14 MPa) containing SO₂ (13,492 ppmw) and DI H₂O (759 ppmw). Phases identified by XRD include iron sulfite hydrate [FeSO₃·3H₂O] [PDF# 22-1017], and lesser amounts of gravegliaite (Mn+2SO₃·3H₂O) [PDF# 61-6628], and rozenite (Fe(SO₄)(H₂O)₄) [PDF# 60-9435].

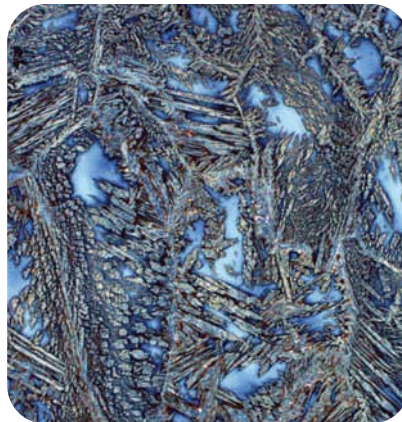
Class 10 (color)

1st Place

Duplex Steel Etched with LBI

Lukasz Boron

Foundry Research Institute
Krakow, Poland



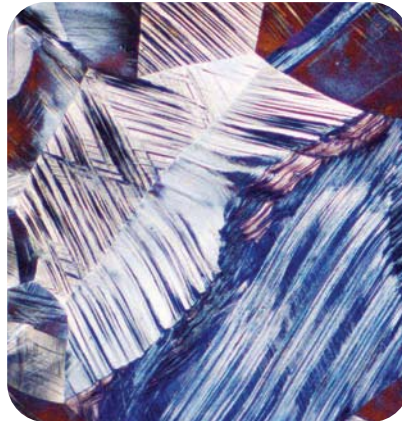
Microstructure of duplex stainless steel (material in accordance to ASTM A 890-5A: Standard Specification for Castings, Iron-Chromium-Nickel-Molybdenum Corrosion-Resistant, Duplex (Austenitic/Ferritic) for General Application). Sample preparation consisted of grinding on 220- μ m paper for 1 min and polishing using diamond paste (9 μ m for 4 min; 3 μ m for 6 min; and 1 μ m for 5 min; followed by a final polish using colloidal silica suspension (OP-S) for 1 min. Sample was etched using LBI (20 g ammonium difluoride (NH₄F HF), 0.5 g potassium bisulphite (K₂S₂O₅). Photo taken using bright field illumination. Mag: 50 \times

2nd Place

Brush Strokes

Samuel J. Lawrence

Lehigh University
Bethlehem, Pa.



Deformation microstructure of an austenitic TWIP (twin induced plasticity) steel etched with 22% SMB (sodium meta bi sulfate) and photographed using polarized light illumination.

3rd Place

Micropillar Fabricated from a Dense Carbon Nanotube Brush

Siddhartha Pathak

California Institute of Technology (Caltech)
Pasadena

William M. Mook

Swiss Federal Laboratories for Materials Science and Technology (EMPA)
Thun, Switzerland



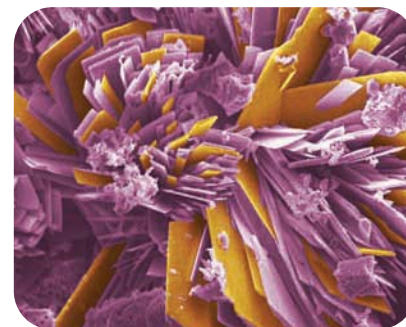
Highly dense carbon nanotube (CNT) brushes produced by high temperature vacuum decomposition of SiC single crystals were fabricated to a 500-nm diameter pillar using focused ion beam (FIB) micromachining and imaged using a scanning electron microscope (SEM). Mag: 10,000 \times

Honorable Mention

Woodpile (SEM)

Nat Saenz, Todd Schaefer,
and James Coleman

Pacific Northwest National Laboratory (PNNL)
Richland, Wash.



This image was collected after reacting a dolomite core with water equilibrated with scCO₂ containing ~12,000 ppmw of SO₂. The reaction product was identified by x-ray diffraction (XRD) as the mineral Hannebachite [CaSO₃·0.5 H₂O]. The program's objective is to examine impacts of sequestering CO₂ containing impurities on specific geologic formations that could function as reservoir seals for long term storage of CO₂.