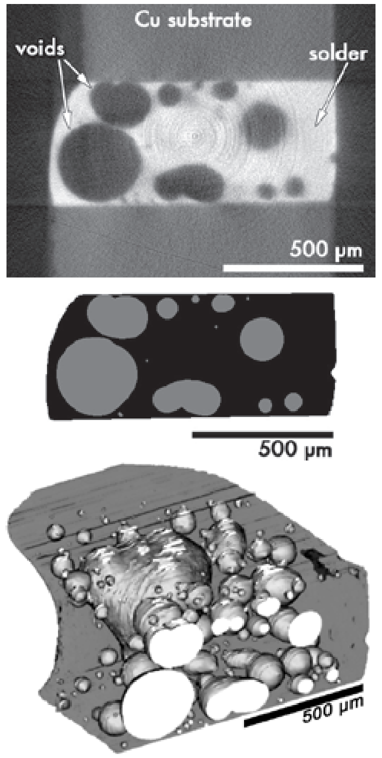
Photgraphs and Illustrations

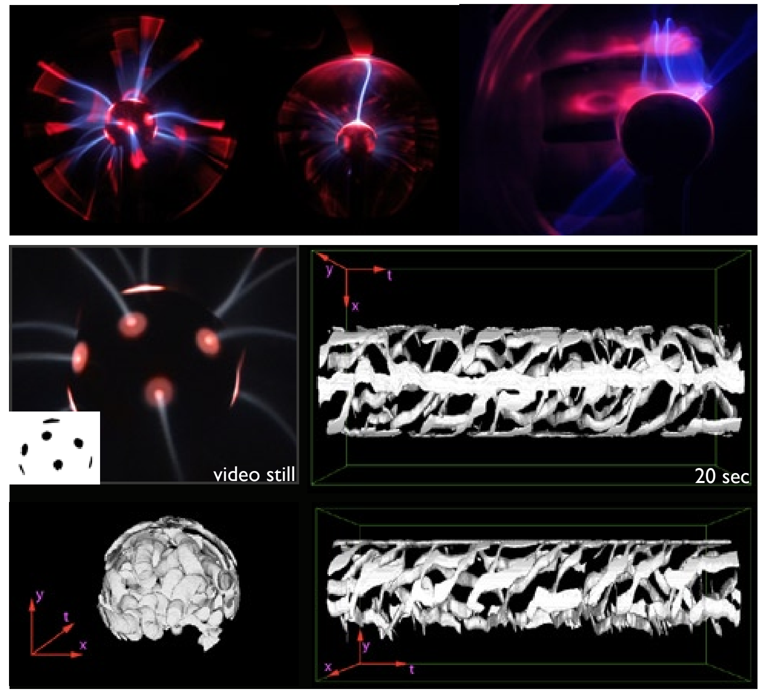
2002 - 2010

Steve Kranz

SOLDER, PILLBUGS and PLASMA

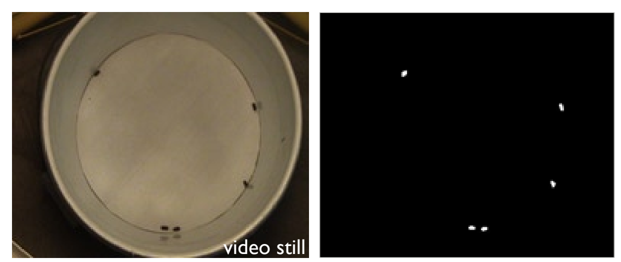


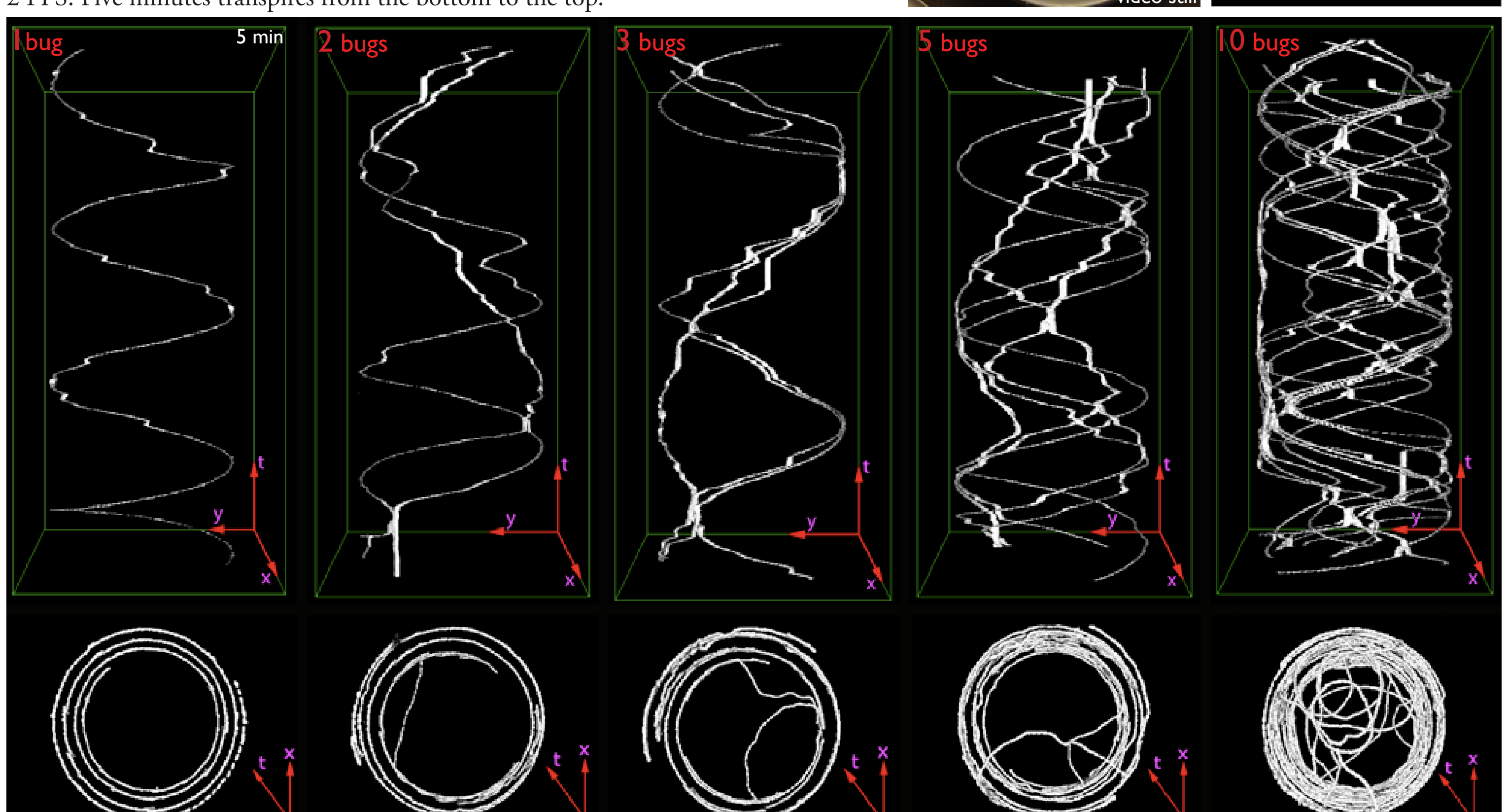
Non-destructive, high-resolution (<1µm) X-ray tomography was used for 3D visualization of pores in Sn-3.9Ag-0.7Cu/Cu joints. The X-ray images were segmented to isolate the pores and the solder. These segmented images were stacked in a third dimension with Mimics 3D reconstruction software to create a digitized model. X-ray tomography by Xradia. Reconstruction done in conjunction with M. Dudek and N. Chawla.



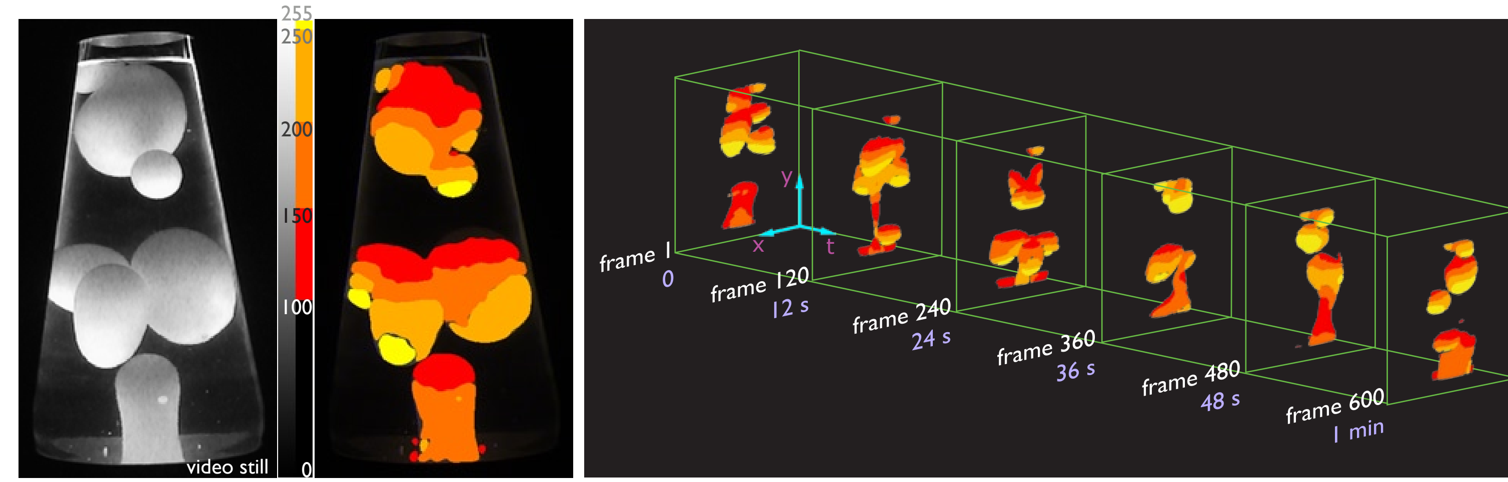
Here, the red portion of the plasma filaments on the inner electrode of a plasma lamp are isolated and stacked. This model is a stack of 600 frames at 30 FPS. Twenty seconds transpires from the origin to the end of the model.

In the model of the solder joint, a series of 2D cross sectional images were obtained then stacked one on top of the other to create a 3D model. The same process can be performed with a series of 2D images that change over time. Here, pill bugs move around the bottom of the bucket while being filmed from directly above. One, two, three, five and ten bugs were filmed seperately. These models are stacks of 600 frames at 2 FPS. Five minutes transpires from the bottom to the top.

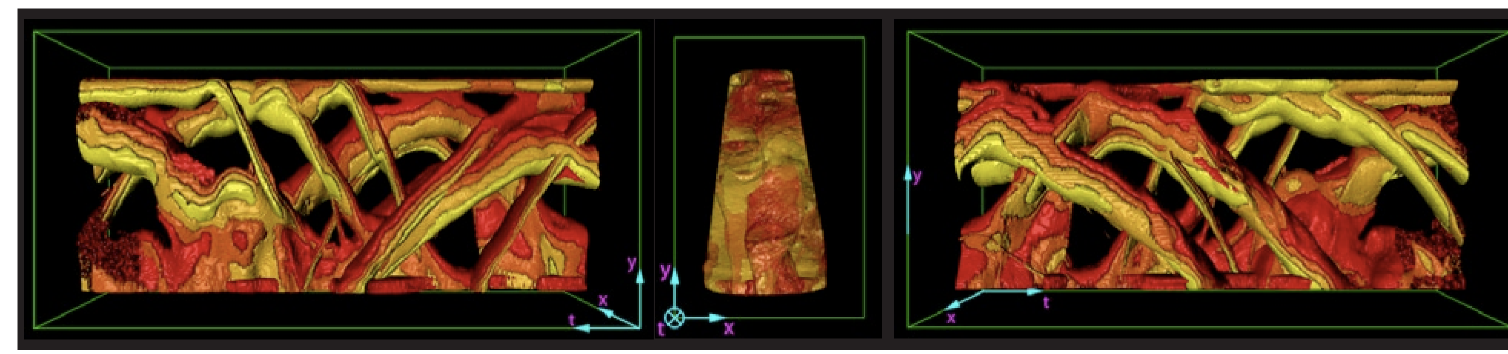


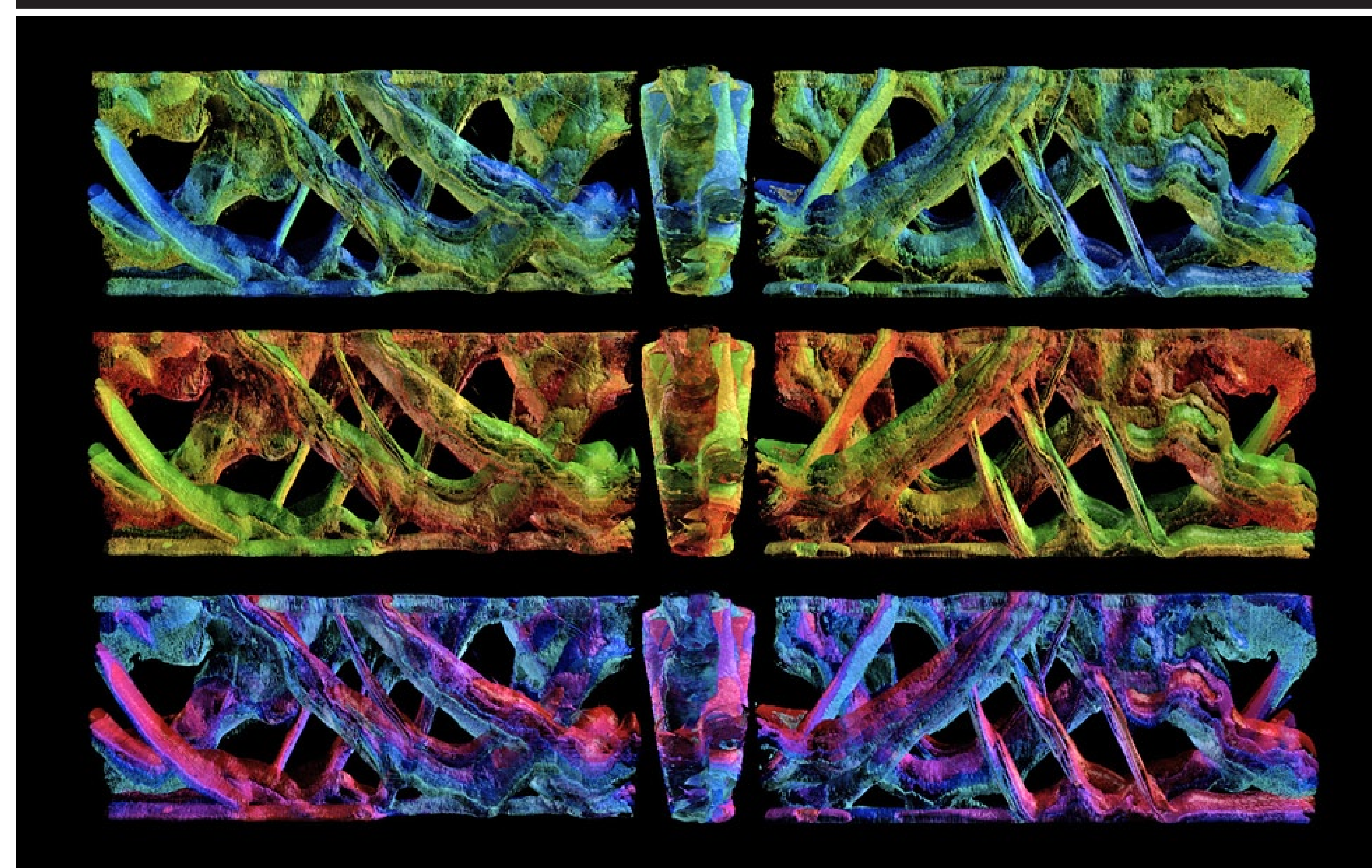


LAVA LAMP

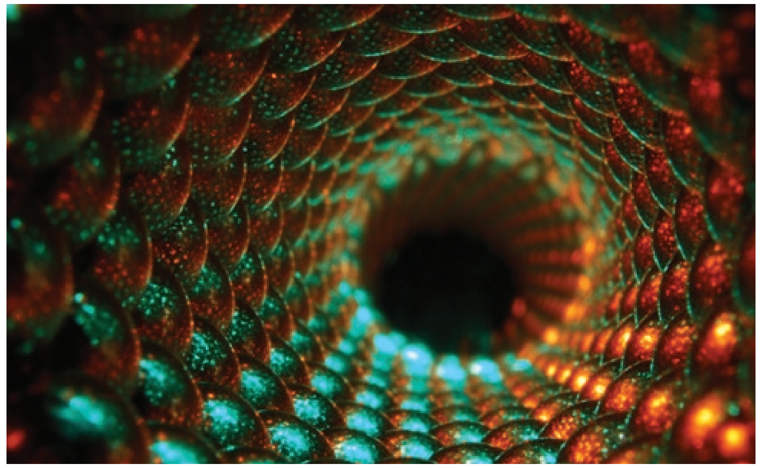
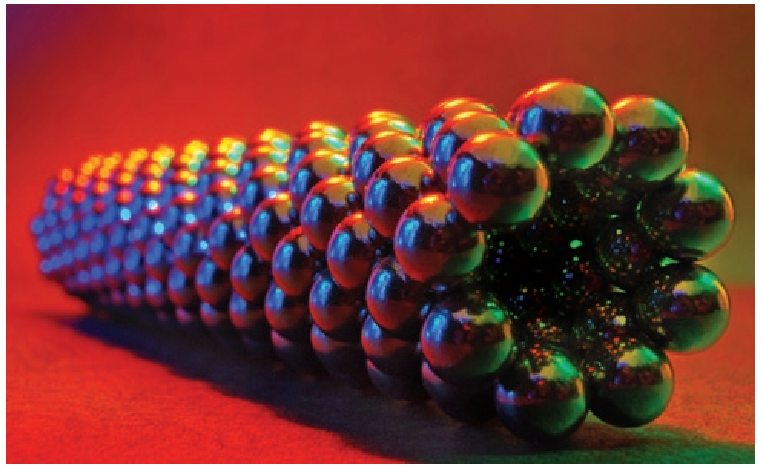


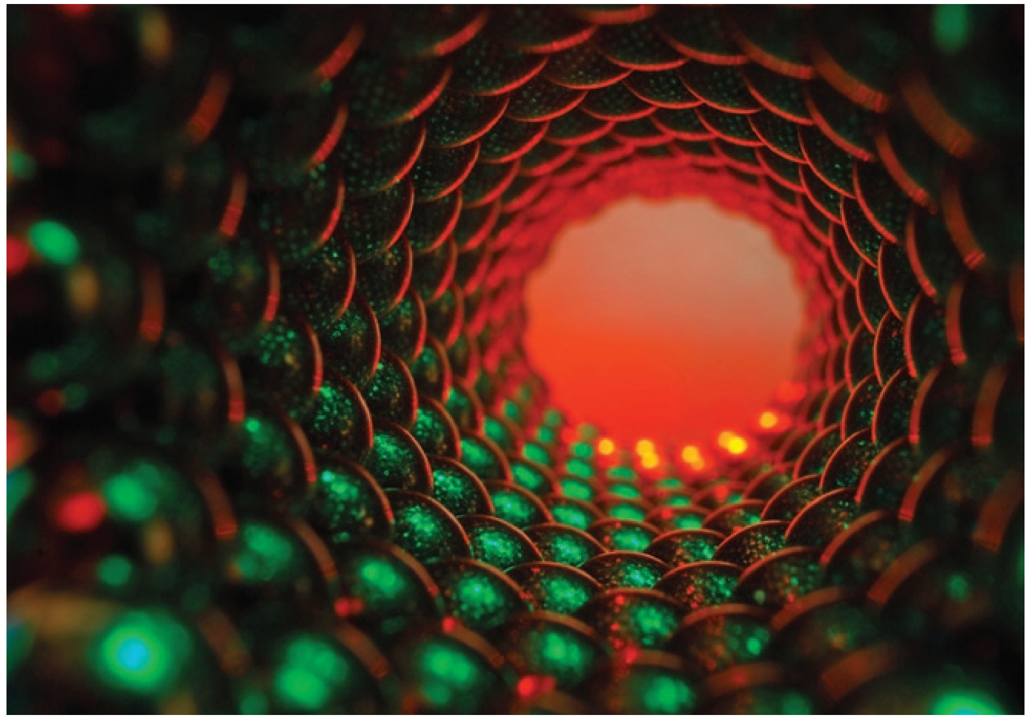
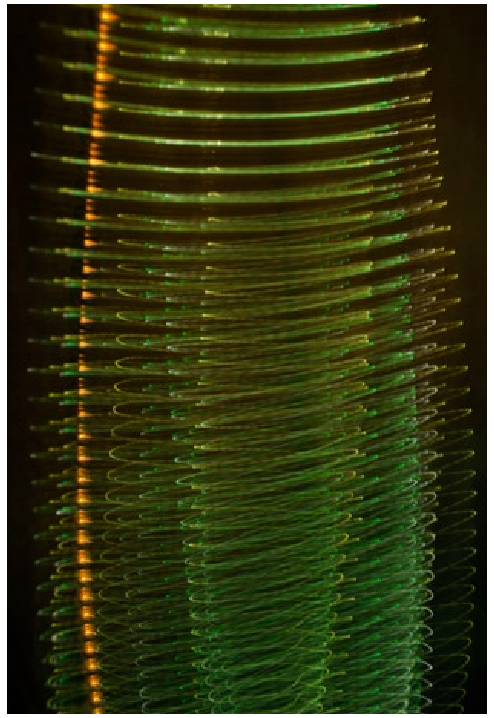
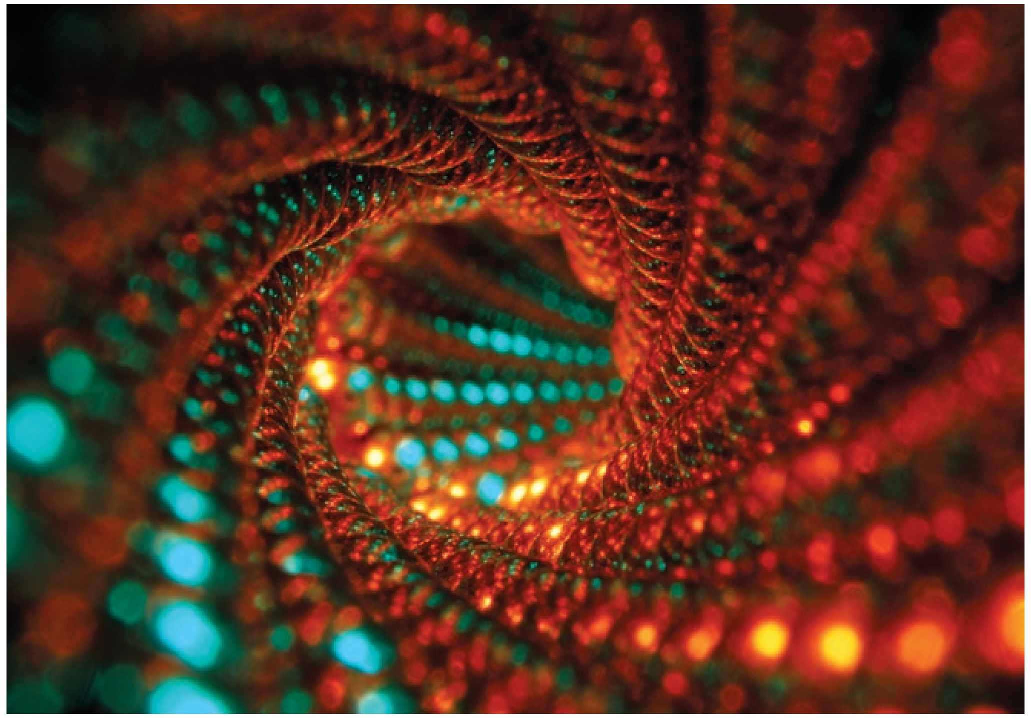
A one minute long movie of a lava lamp was converted to an image sequence at 10 FPS. Using Photoshop and ImageJ, the images were thresholded according to four levels of luminosity. Each level was reconstructed seperately as a 3D model in OsiriX. These models were combined and colored in Cinema 4D. In the bottom image, the models were made semi-transparent and each of the four levels of luminosity were givin a different index of refraction ranging from n = 1.1 to 1.25.



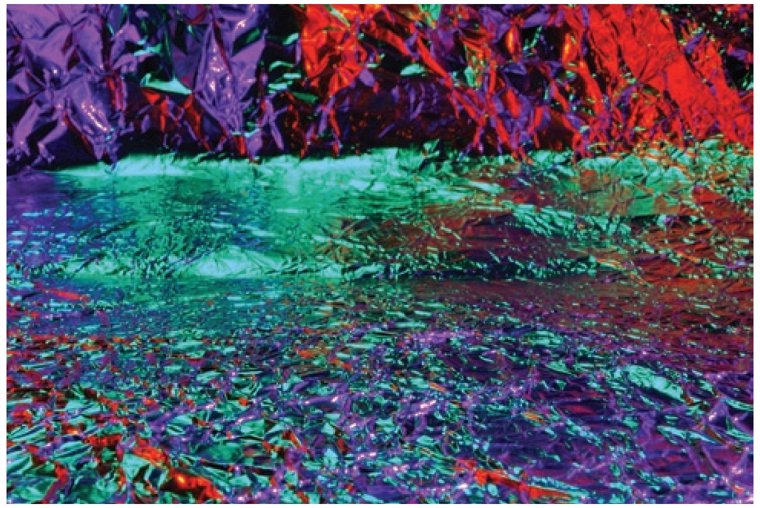
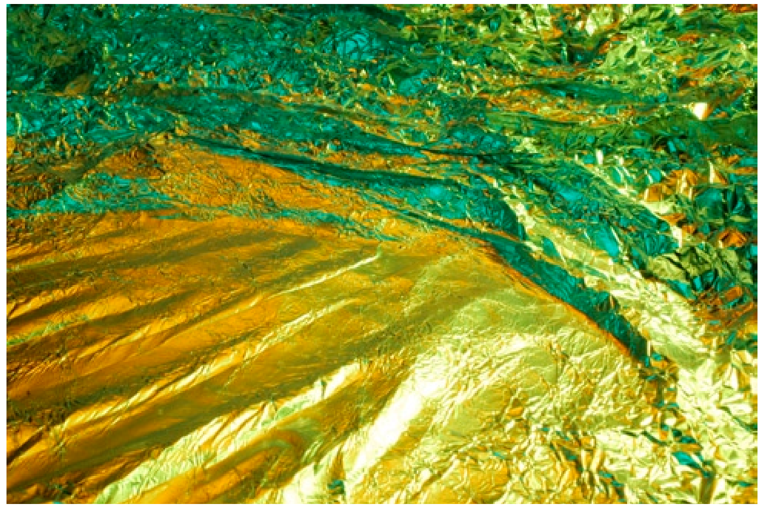
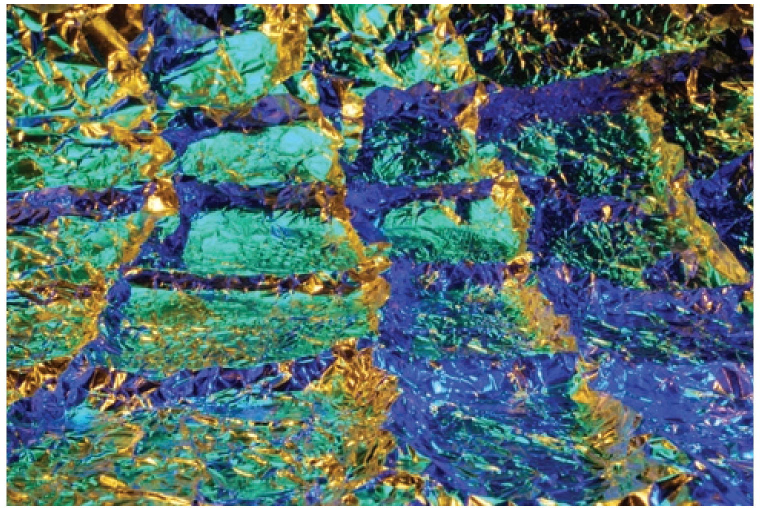
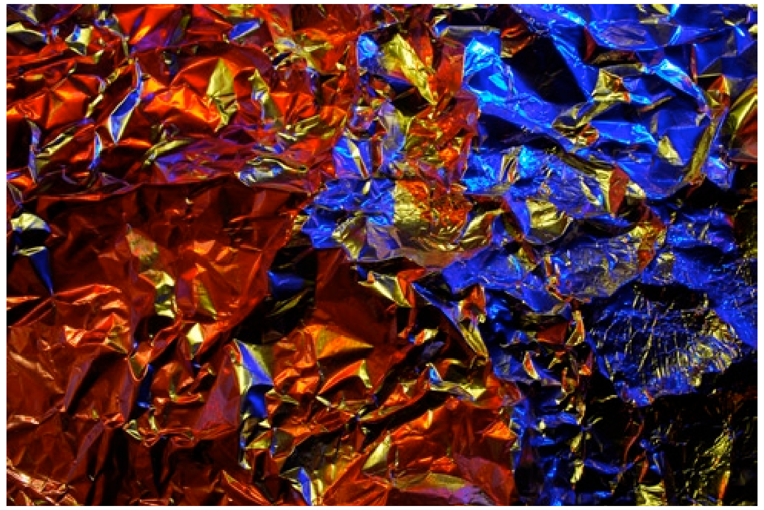


NEODYNIUM SPHERE MAGNETS

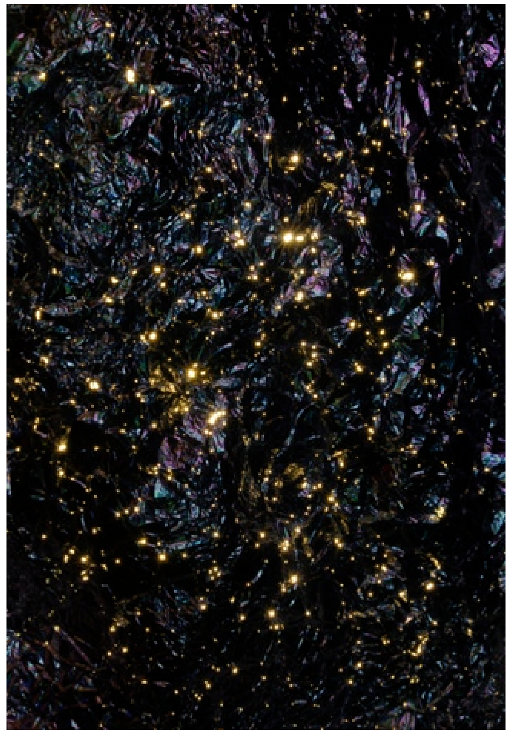
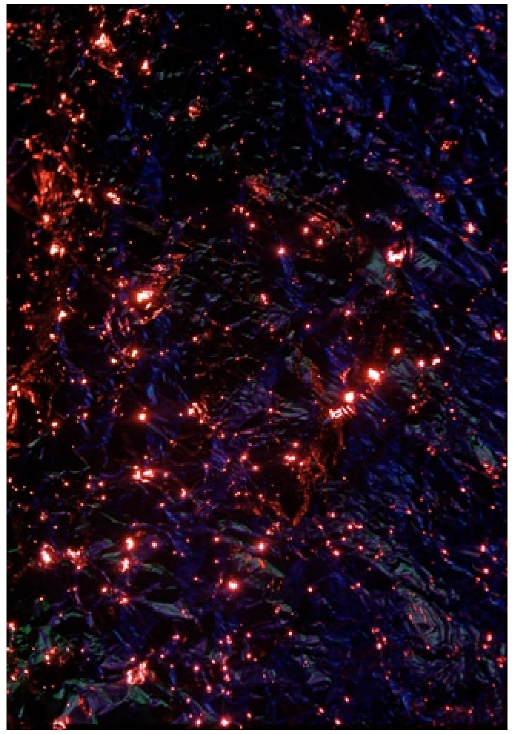
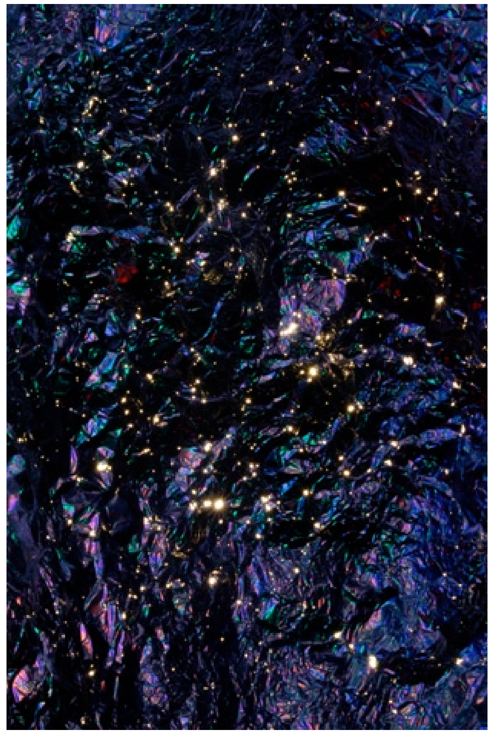



ALUMINUM FOIL

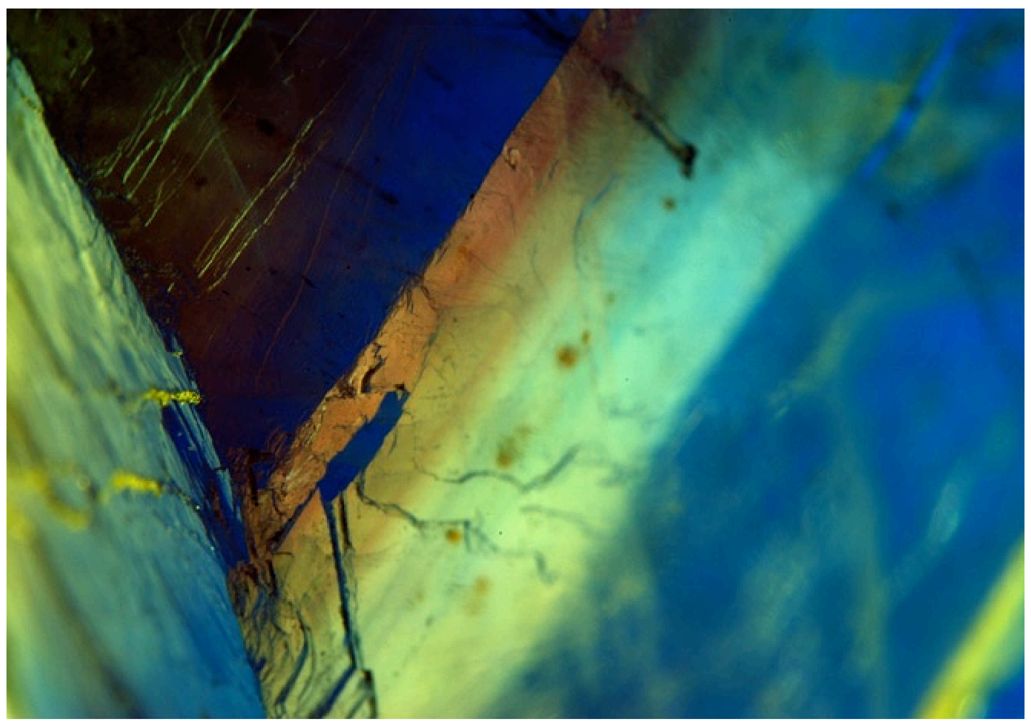





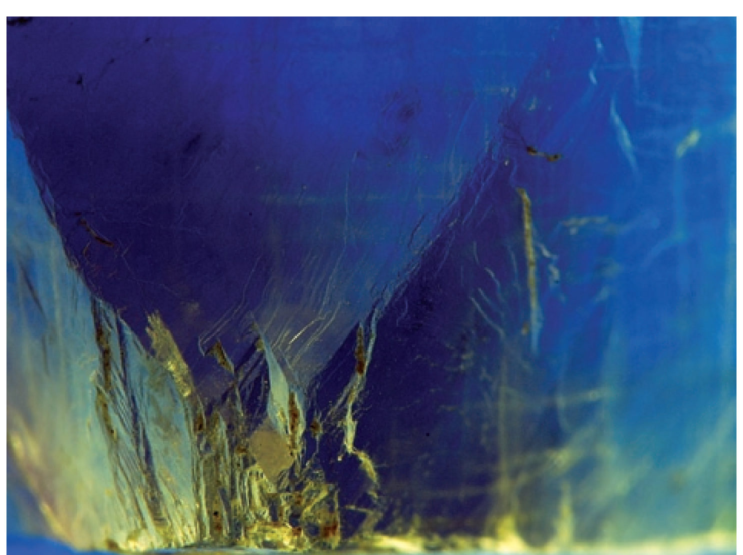
On the opposite page, the subjects are neodynium sphere magnets 3/16" in diameter. They can be drawn into a string and the string of magnets can easily be coiled around itself to form a carbon nanotube-like structure. The vertical images on that page are two second exposures of a dangling string of magnets that were in motion. Above, aluminum foil is illuminated by three seperate light sources. Below, the same sheet of foil is back lit, revealing holes at the intersections of creases, while also lit from the front.

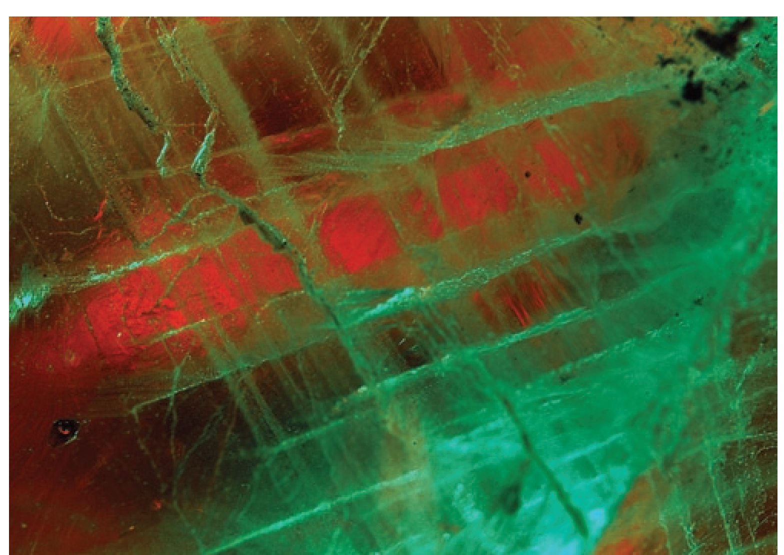




FLUORITE CRYSTAL

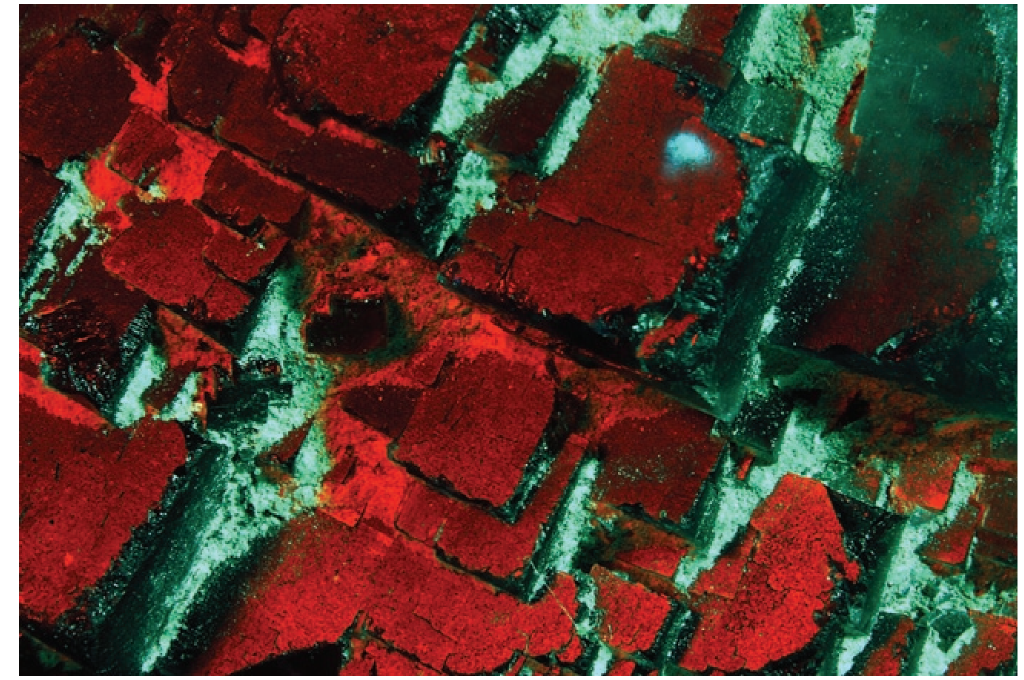
On this page and following spread, a fluorite crystal is illuminated in transmission with two differently colored lights at different angles. A fluorescent lamp covered with colored plastic shines up through the glass and paper the crystal rests on. LED lights from a cell phone covered with a different color of plastic shine through the crystal opposite the camera.

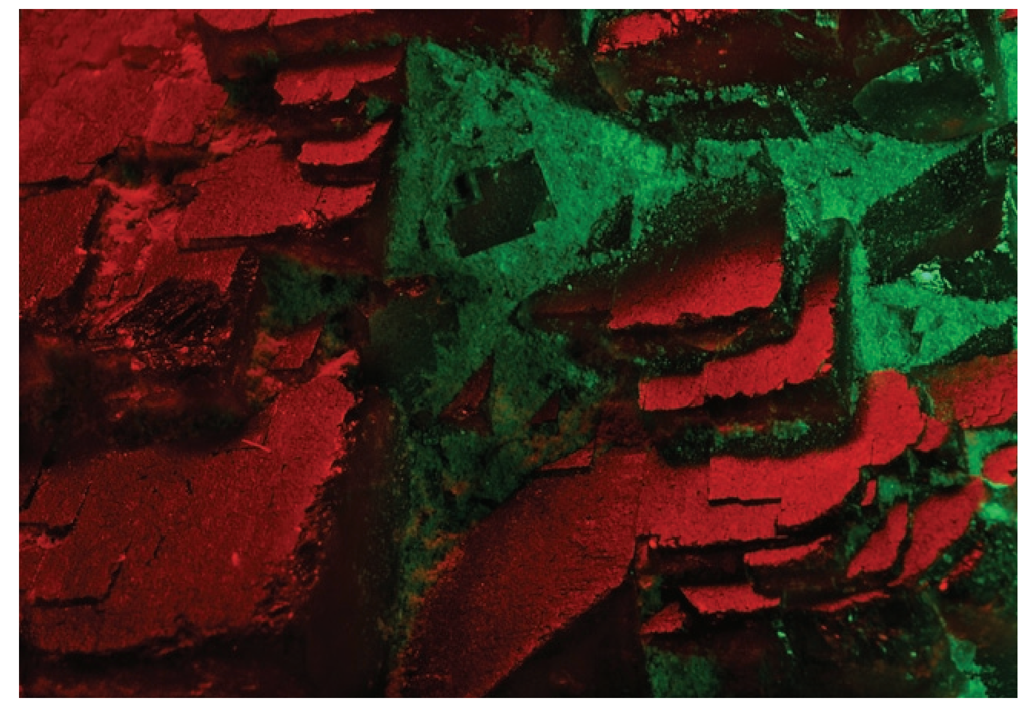




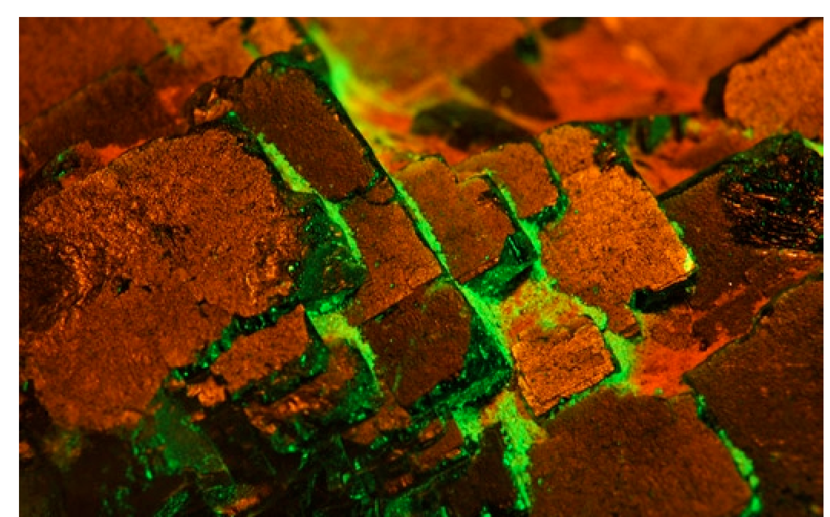


FLUORITE CRYSTAL, CUBIC HABIT

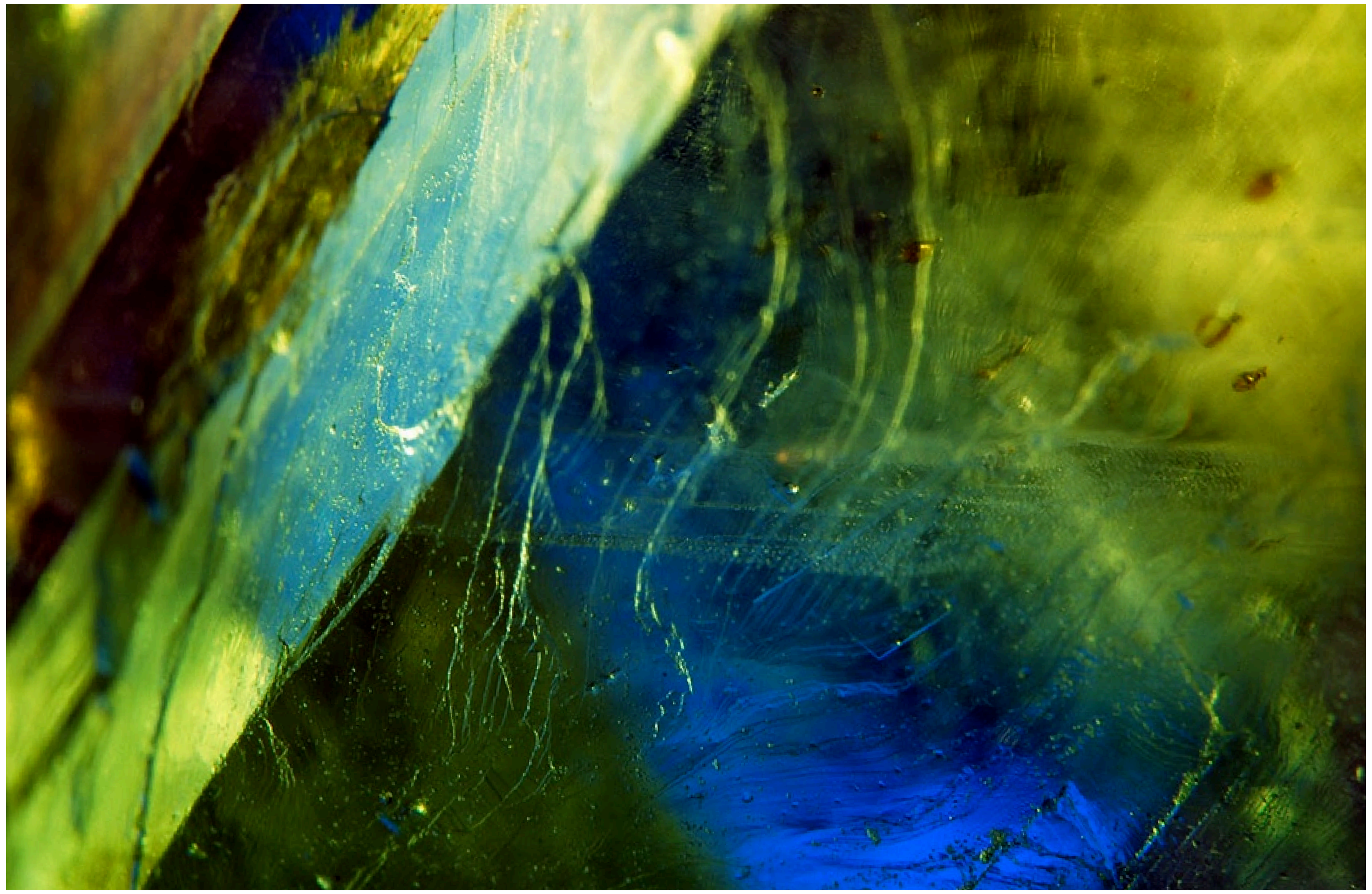


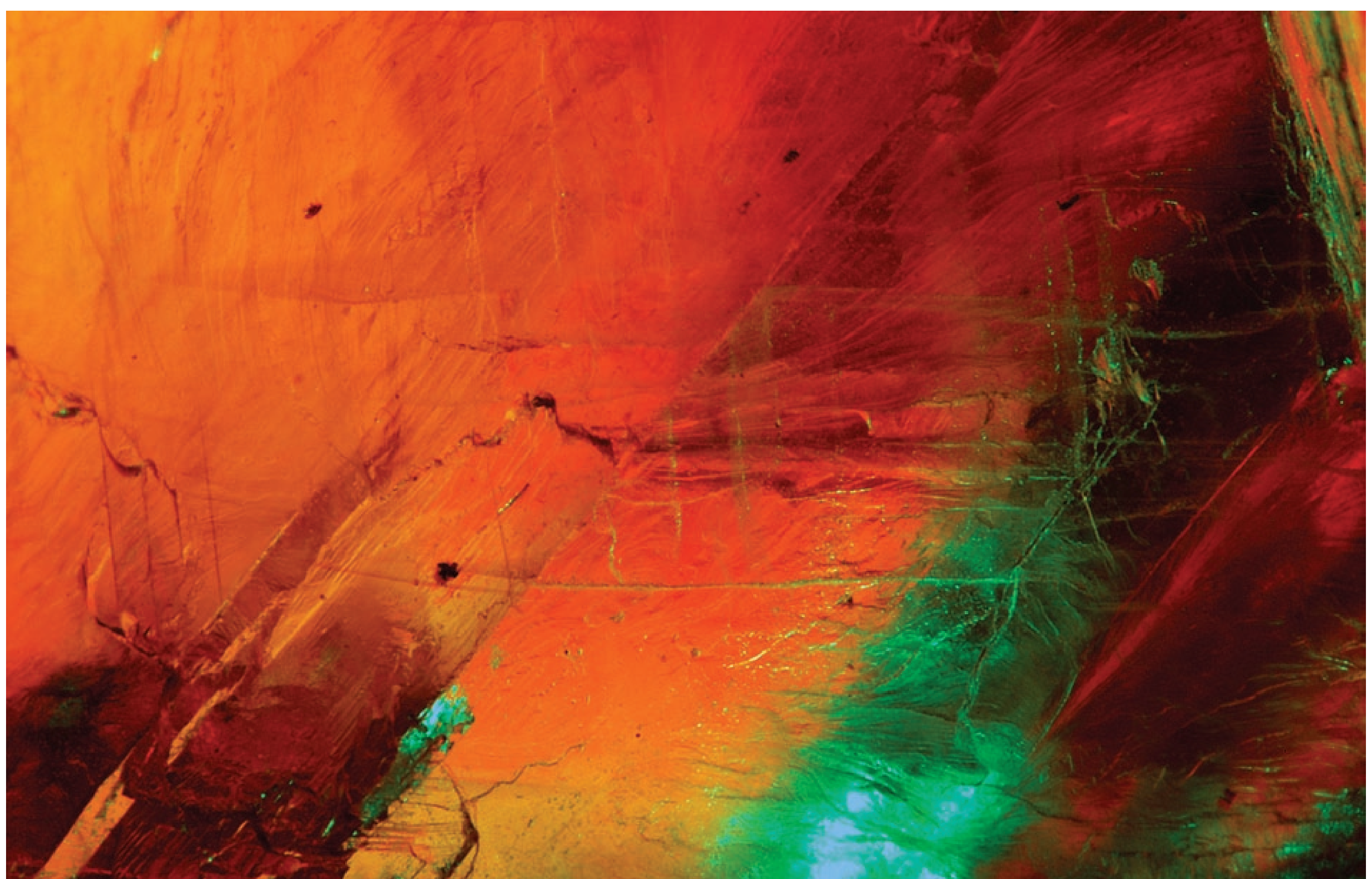


At top right, a fluorite crystal in a cubic habit is illuminated in transmission. Above and on the left side of this page, light reflects off of the surface of the crystal.

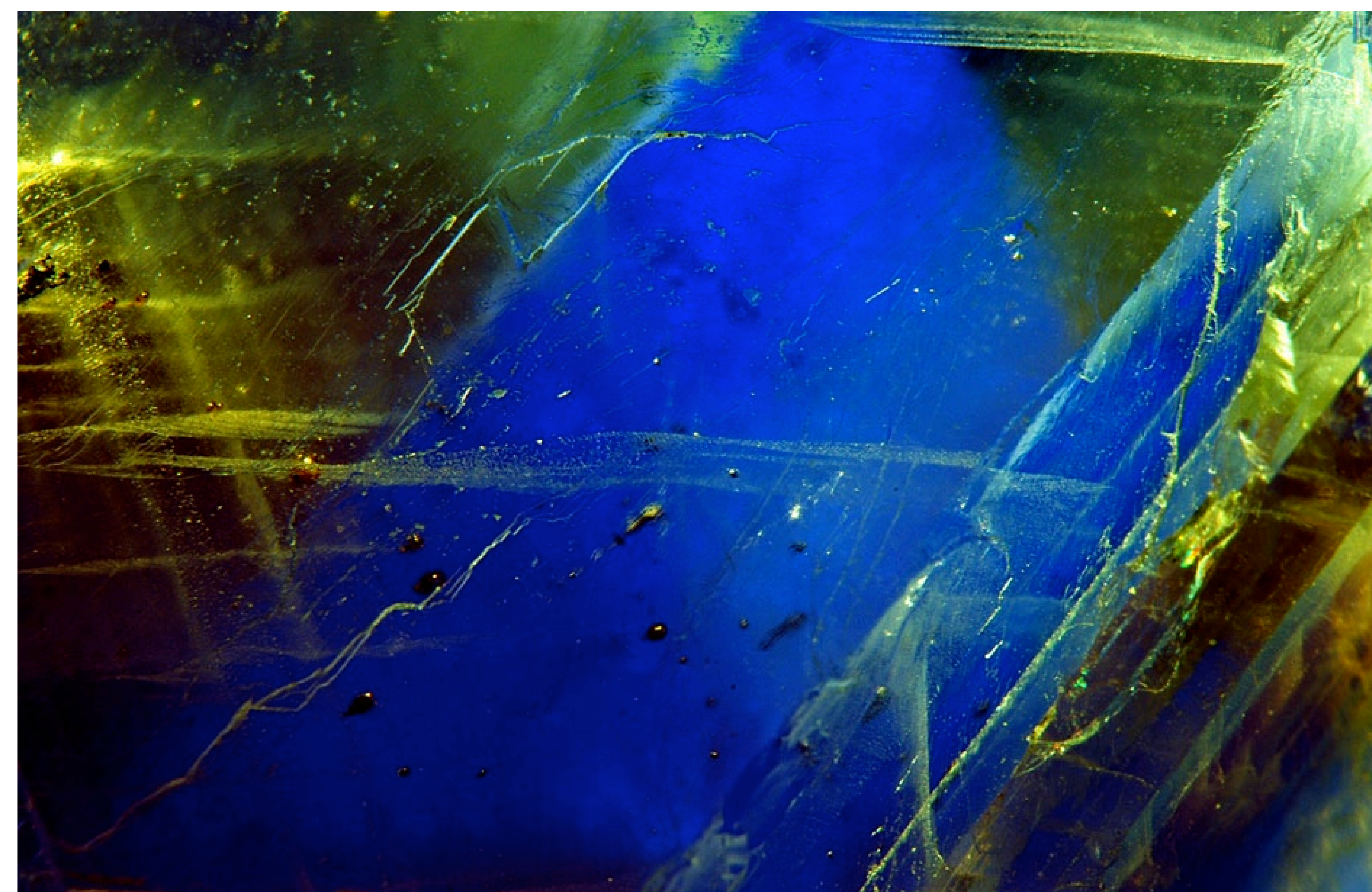


FLUORITE CRYSTAL



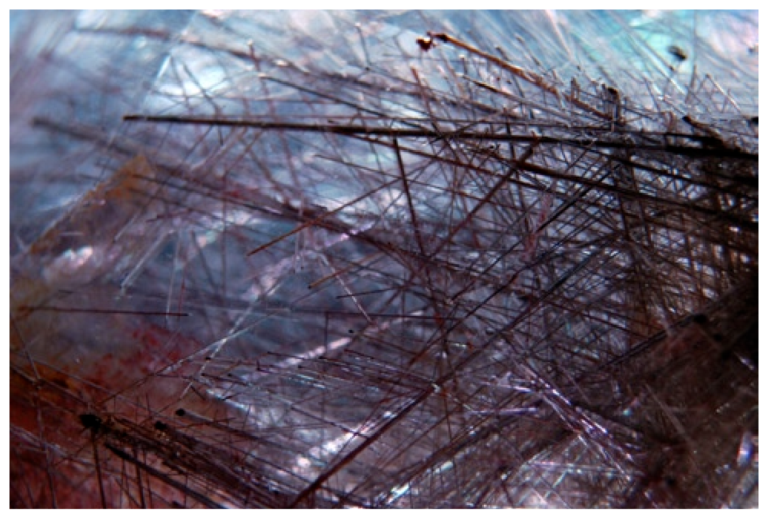


FLUORITE CRYSTAL

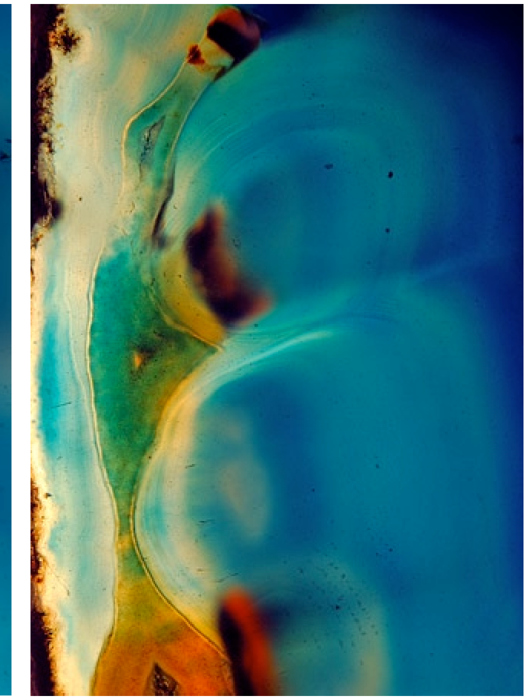


RUTILATED QUARTZ

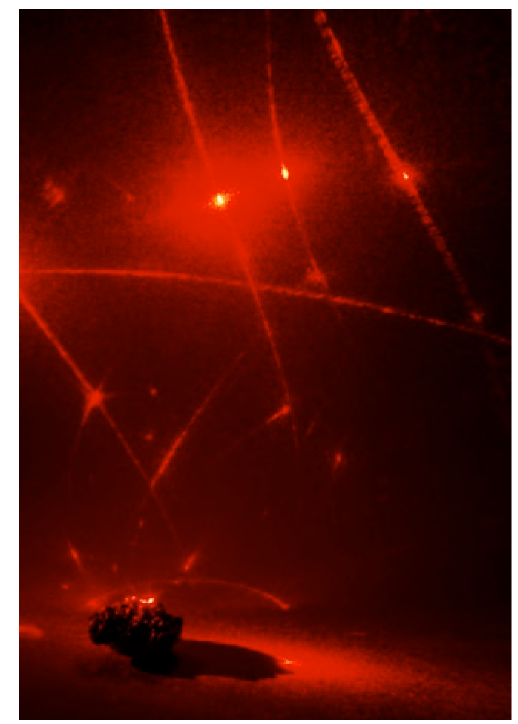
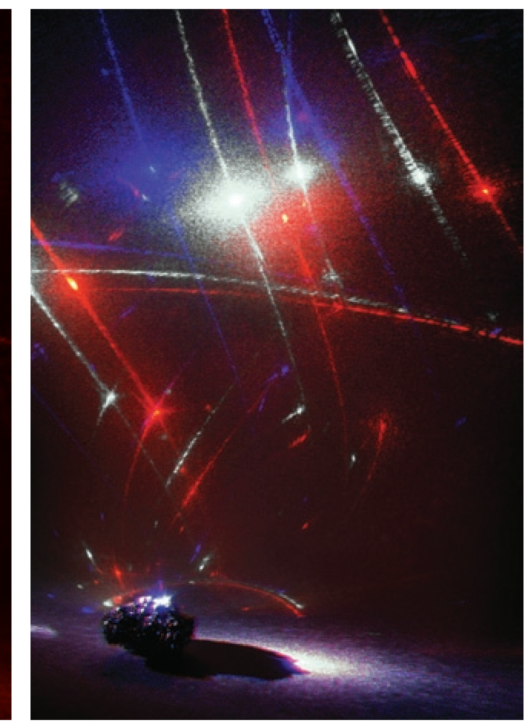
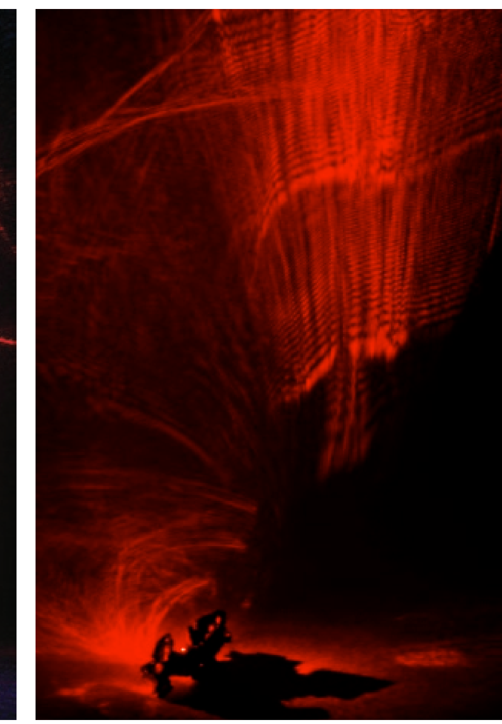
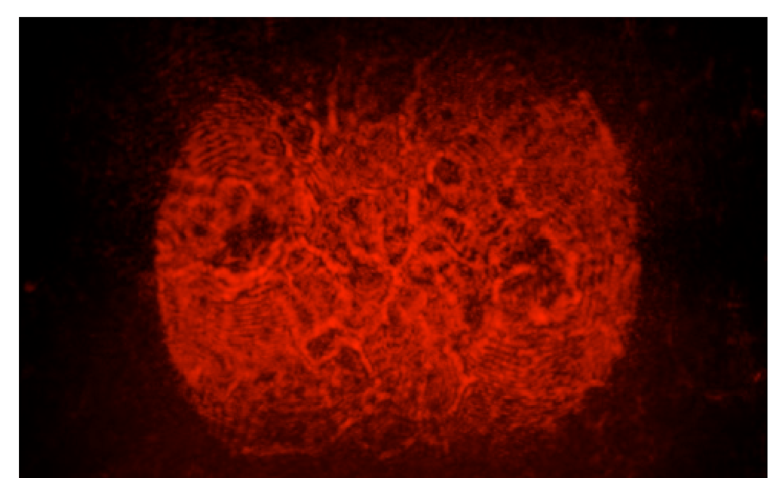
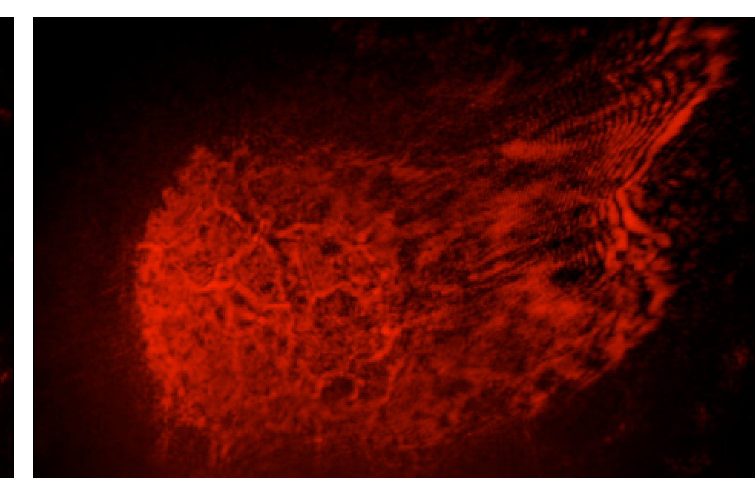


AGATE, BISMUTH, PYRITE and GLASS

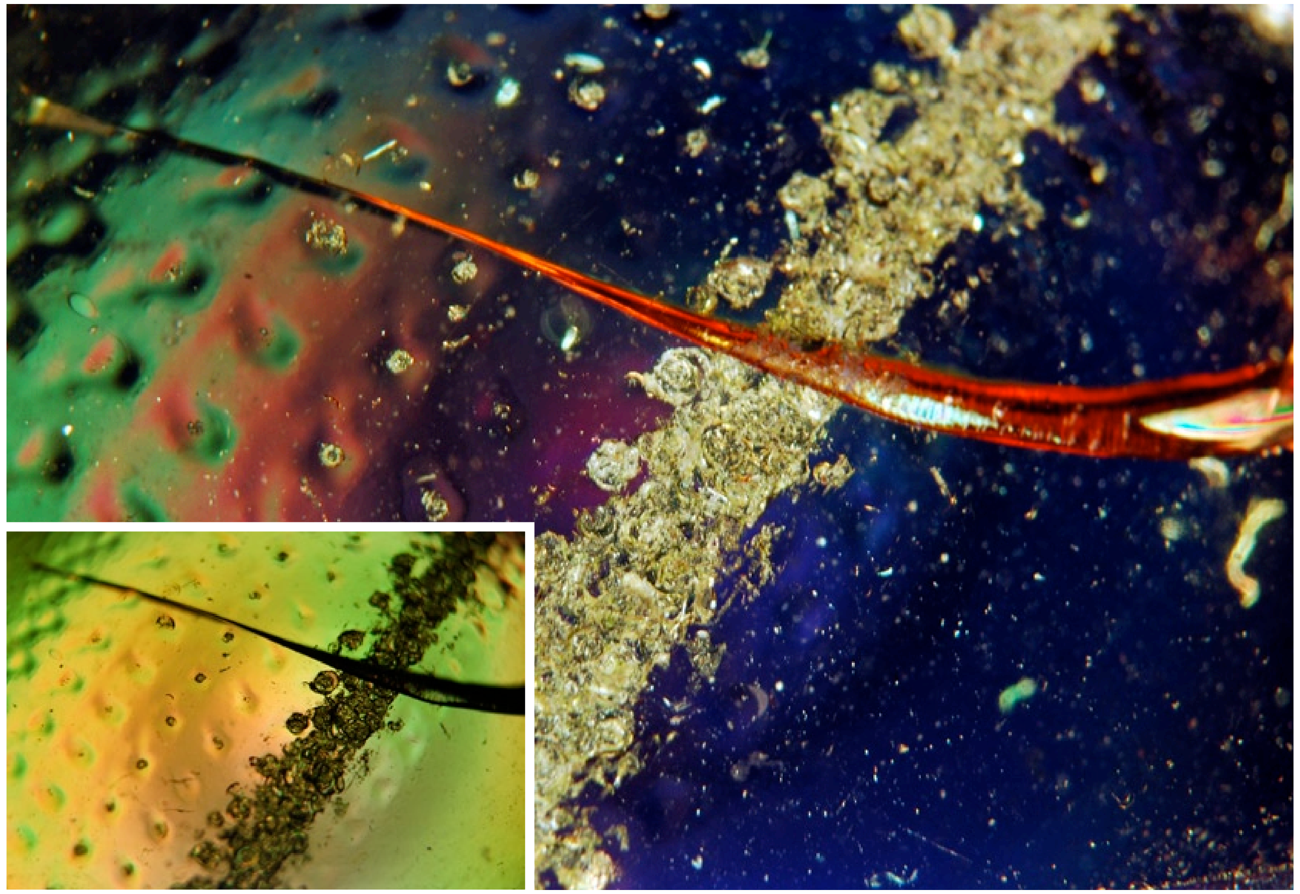



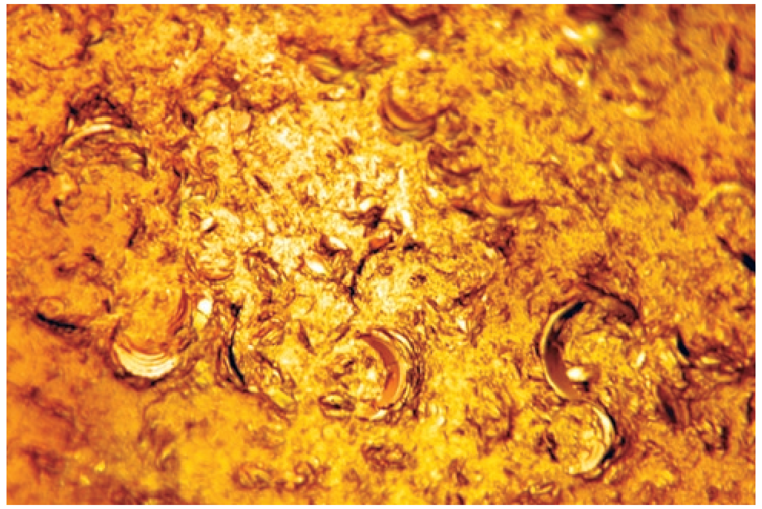
At left is an agate in transmission. Below left, red laser light impinges on pyrite and reflects onto a paper screen. At center, the pyrite sample was rotated several times (three exposures, colors altered). Below is a bismuth crystal and this crystal illuminated by a laser. On the bottom, laser light passes through a glass marble and then strikes a screen.

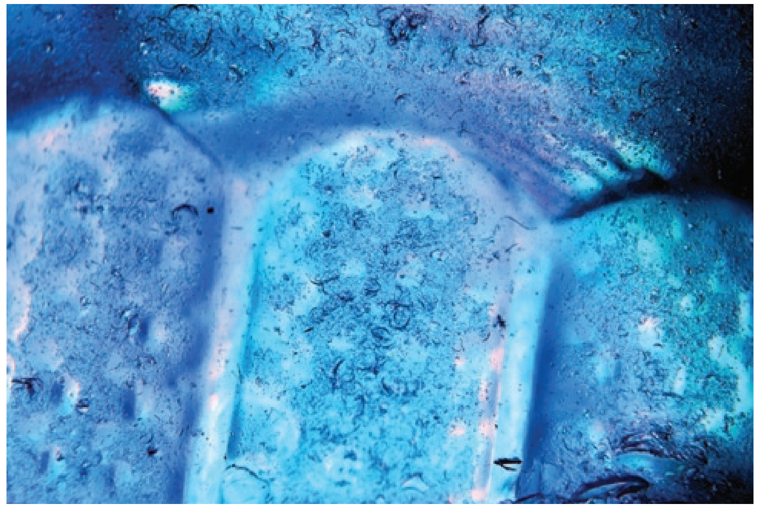







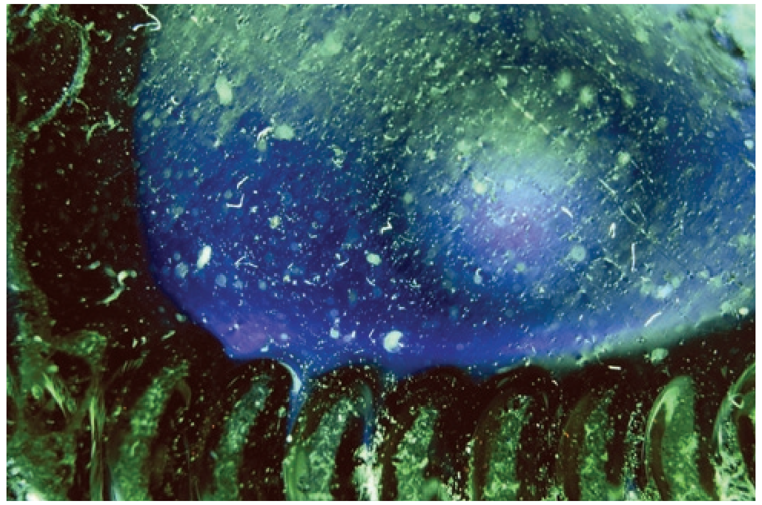
BEACH GLASS

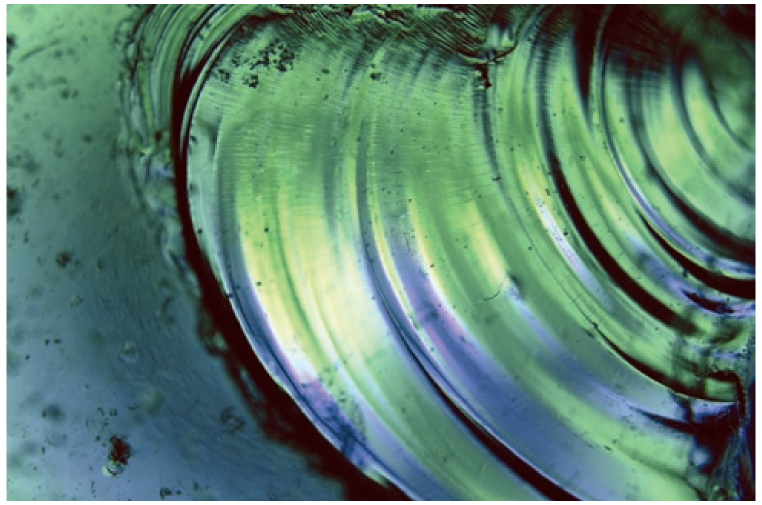
These glass shards found on the beach rest on the lens of a pair of 3D glasses (a circular polar-izera), which sits on a white LED. At right, an amber shard with a fracture is photographed with an out of phase circular polarizing filter attached to the camera lens. The fil-ter is in phase in the inset. Below, a very worn amber glass shard. Below right, a colorless frosted shard is tinted blue by the LED. Bot-tom left and right, out of- and in phase filters were used, respectively.





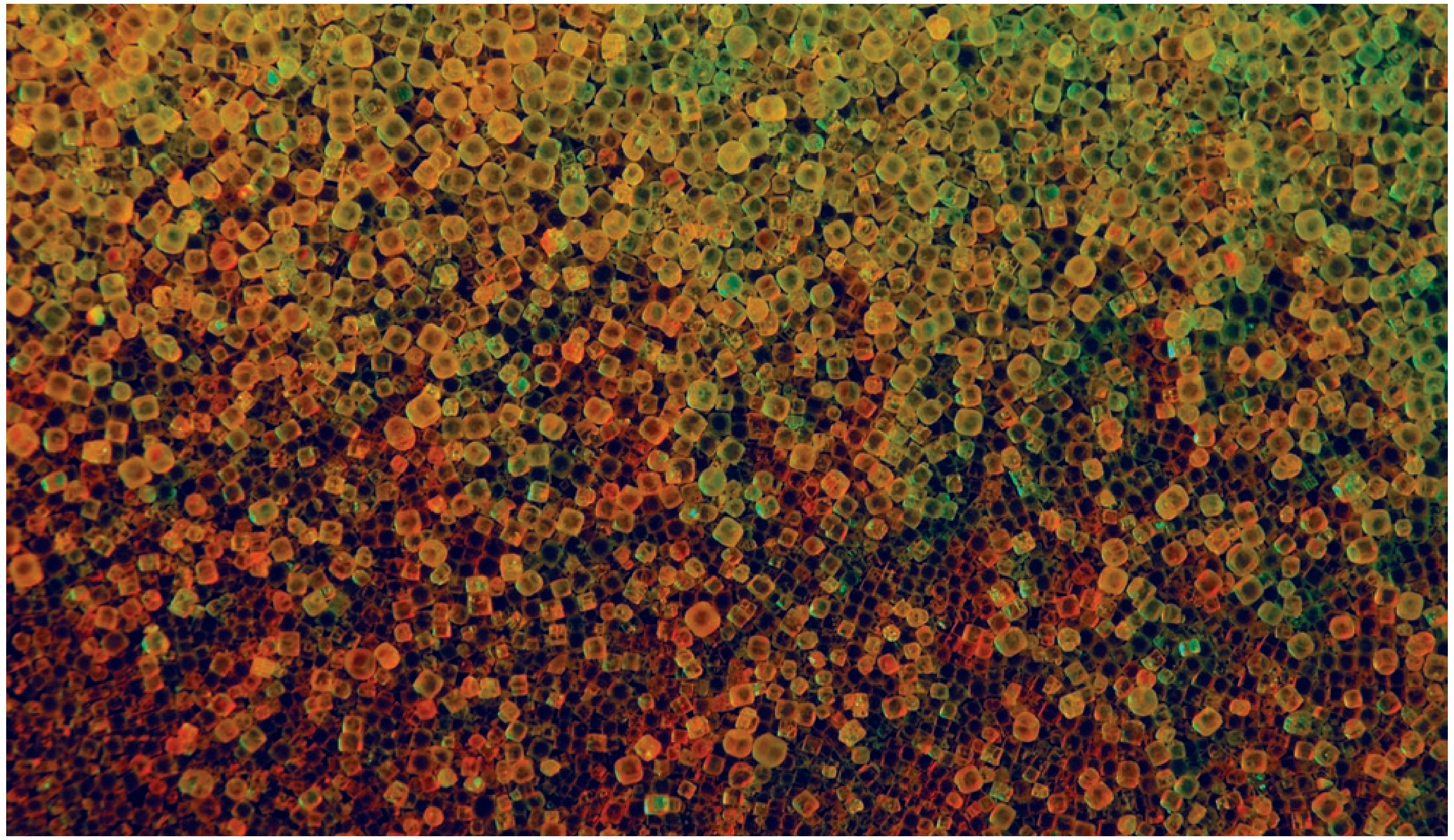




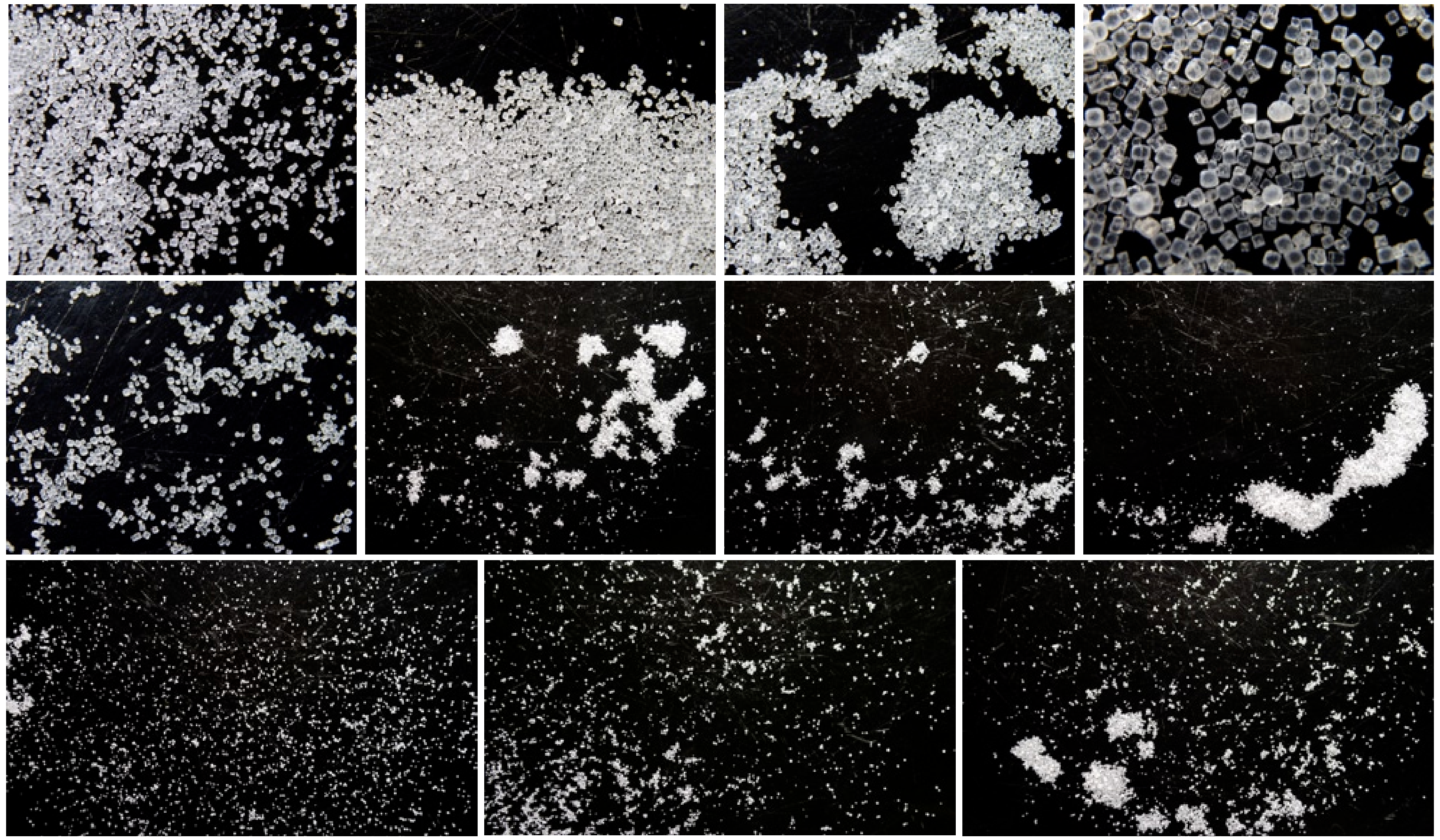


ROCKS, SAND and CORAL - OAHU, HI

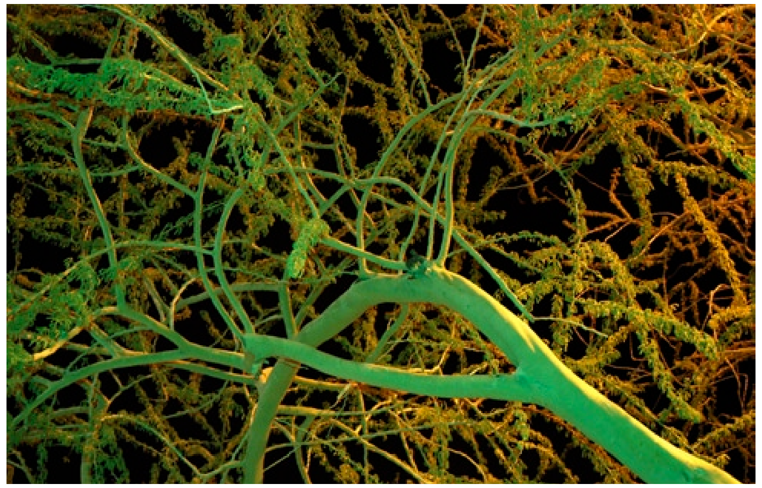
TABLE SALT

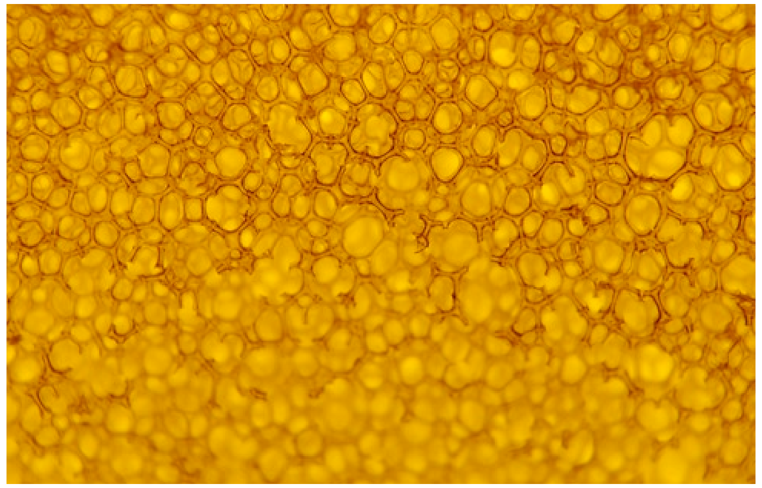


When grains of salt are placed on a ceramic dinner plate and the plate is shaken, the salt grains move about the plate stochastically (like atoms in a fluid). When shaken with less intensity or less speed the "temperature" is reduced and grains with less kinetic energy will not be able to overcome the frictional force of the plate and will sit still. Moving grains will collide with sitting grains, lose kinetic energy and stick (solidify). Below a certain vibration intensity (the freezing point) nearly all grains will be packed in clusters of salt grains (the melt has solidified). Careful observation reveals "liquidus" and "solidus" vibration intensities where grains begin to stick together and where all grains are not moving, respectively.

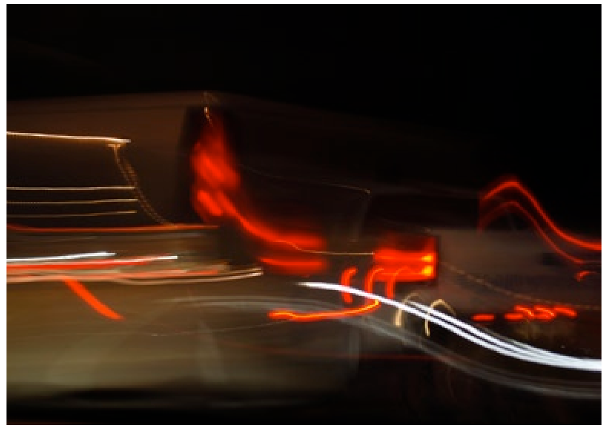


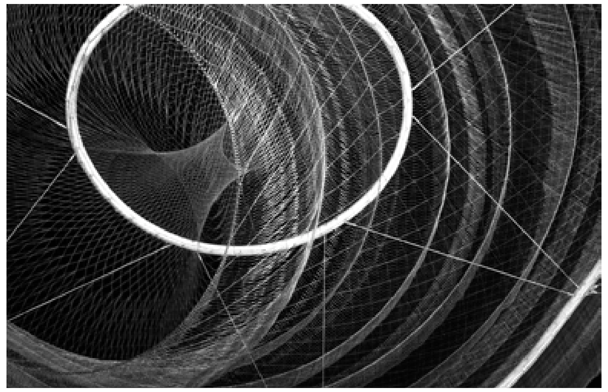
MISCELLANEOUS

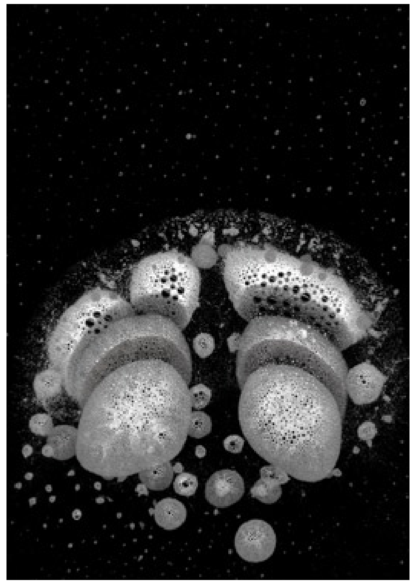


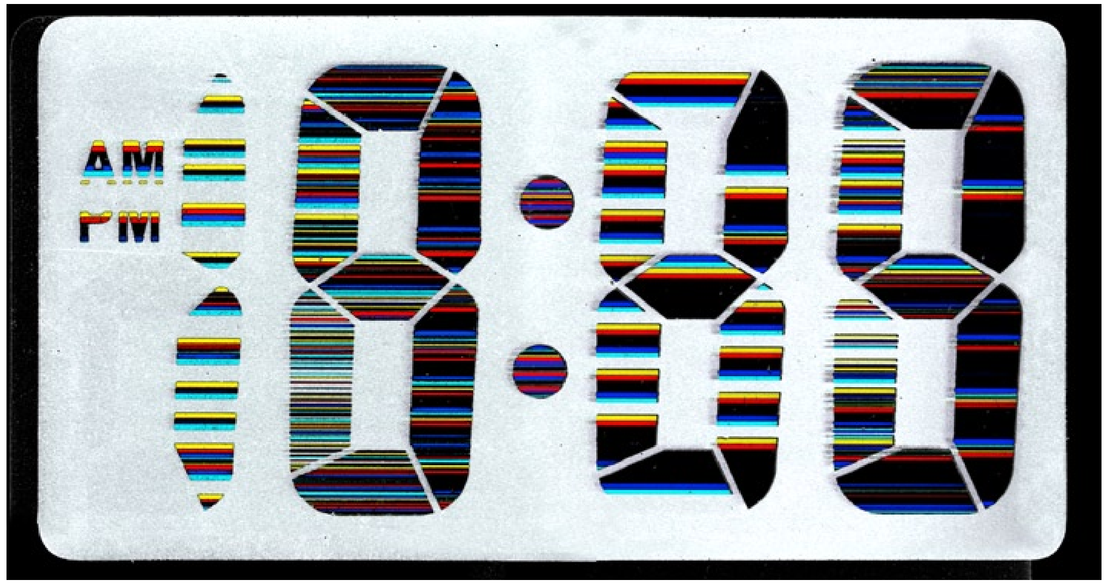


Top left, a tree is illuminated by a street light and a green flash. Top right, shape memory foam. Left, striations in rocks outside Las Vegas. Right, several second exposure from inside a moving vehicle. Below, long exposure of a bonfire on a beach. Below right, a suspened net sculpture. Bottom left, sequence of five scans of Windex sprayed on a flatbed scanner. Bottom right, a digital clock was scanned while the time was constantly changing.

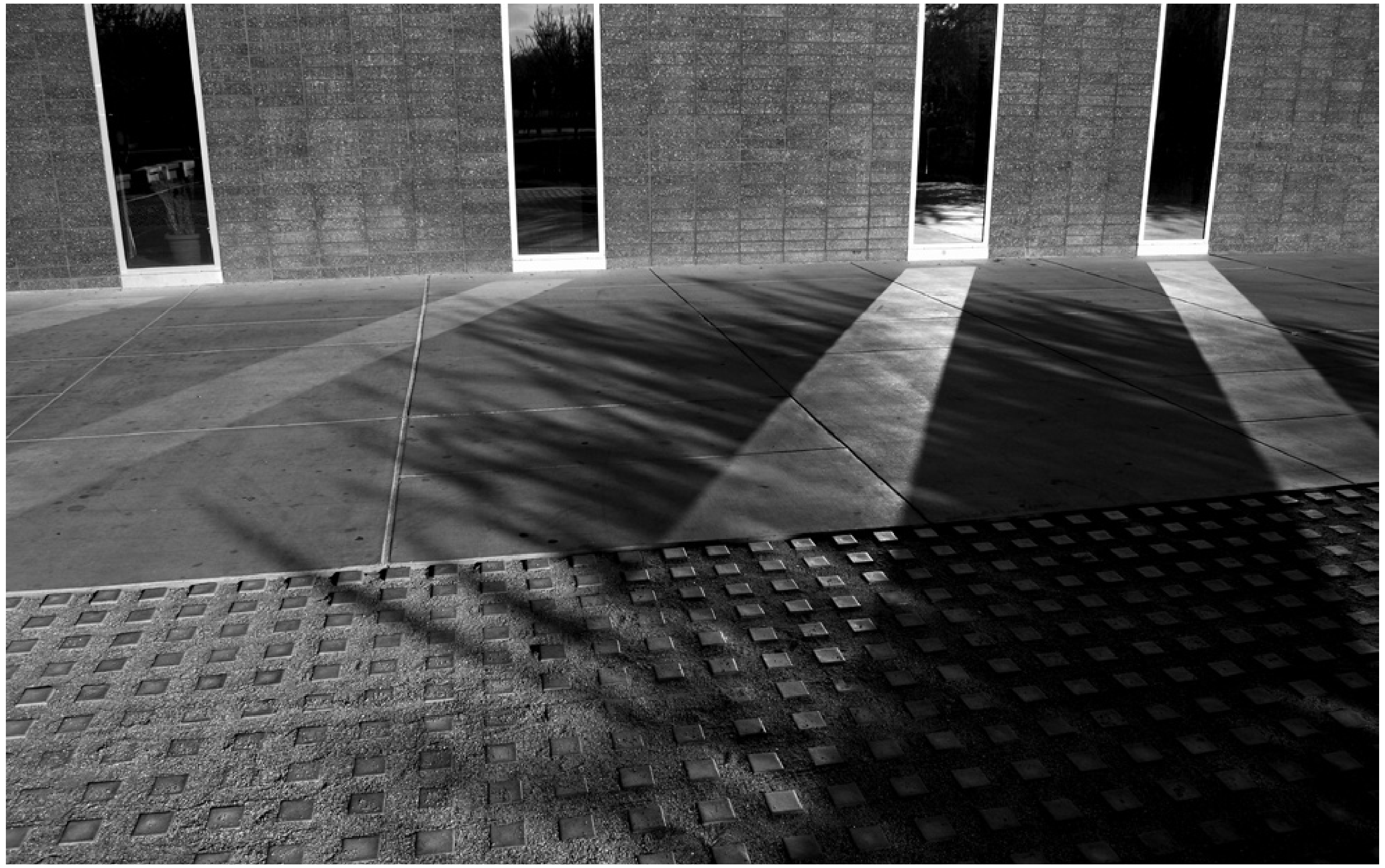




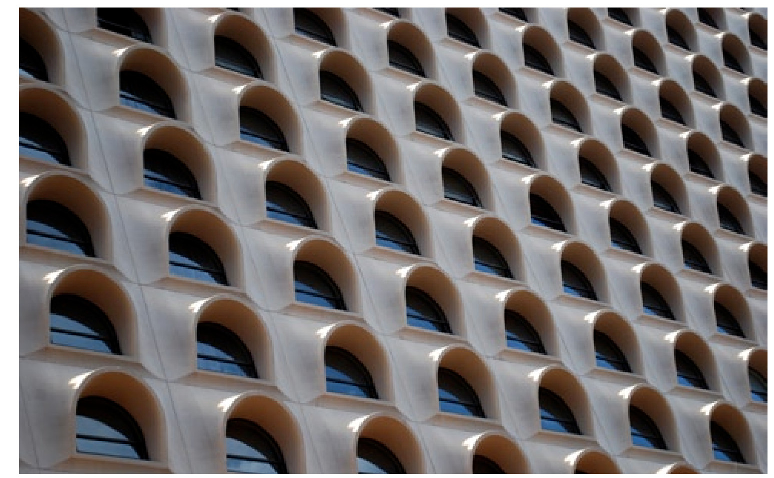


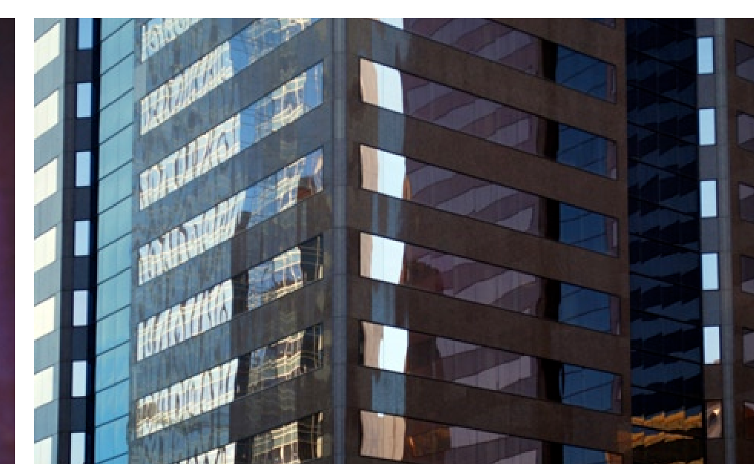


ARIZONA STATE UNIVERSITY - TEMPE, AZ

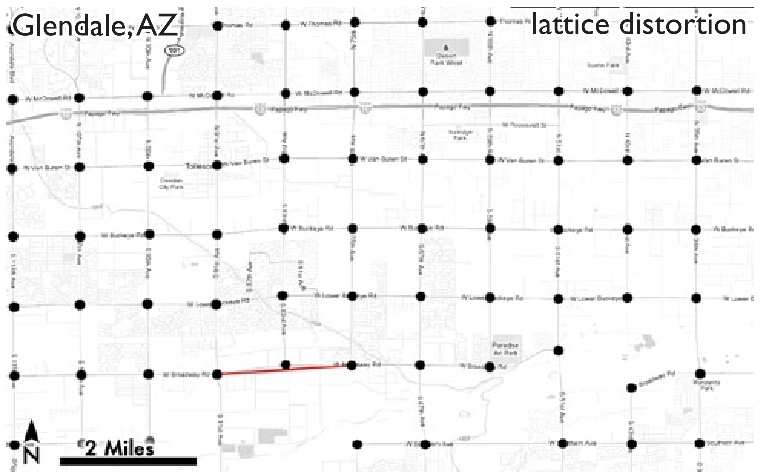


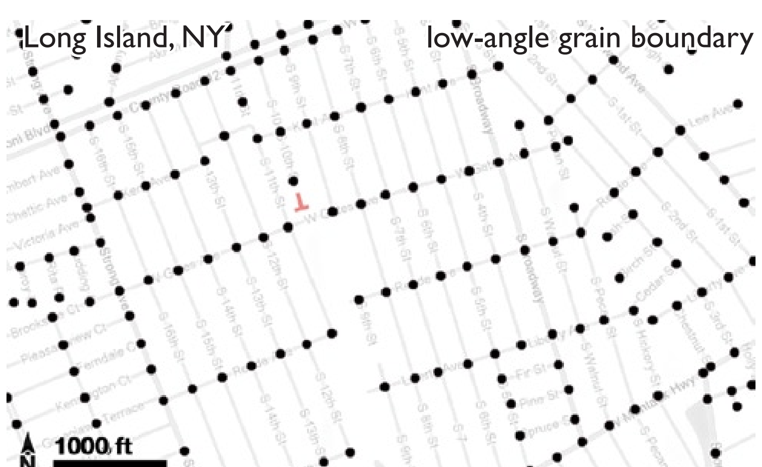
DOWNTOWN PHOENIX, AZ

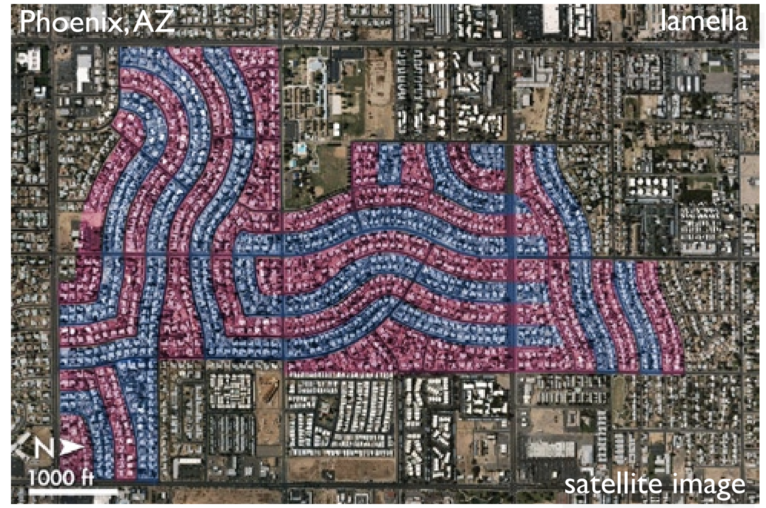




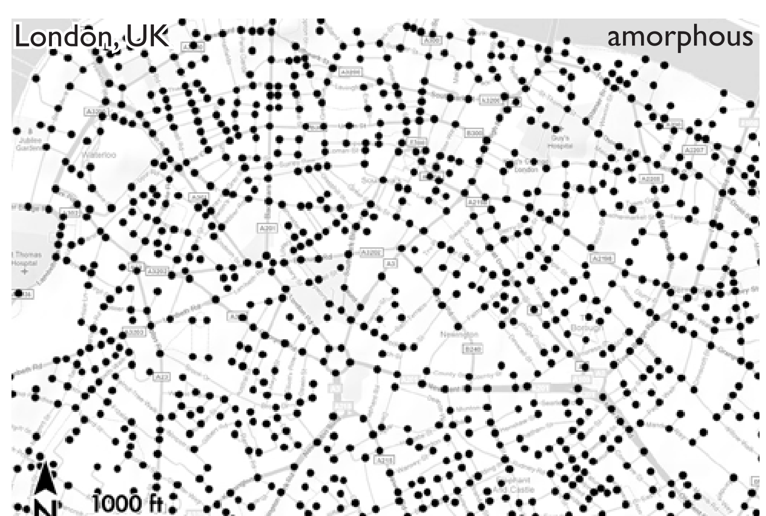
CITY STREETS



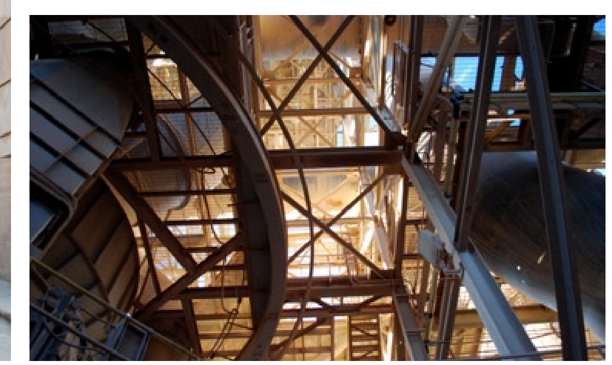


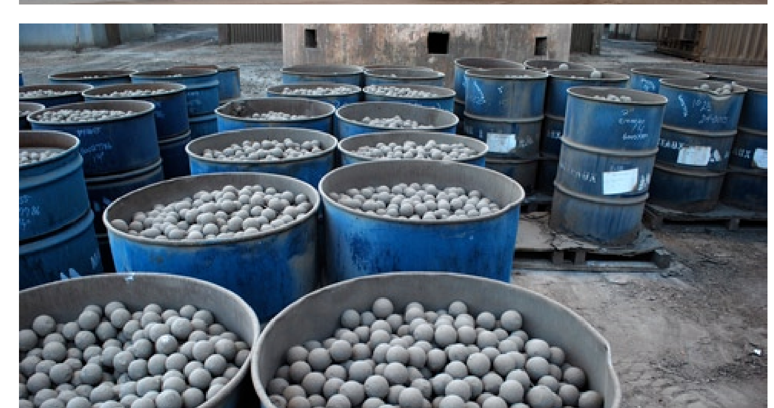


The streets of downtown Phoenix are laid out in a very regular square grid. If atoms (or dots) are placed at the intersections of streets they form a single crystal. Neighborhoods in Brooklyn, NYC meet at odd angles, much like grains of a polycrystalline material. Central London is a great example of a glass. The city grew very rapidly (as if it was quenched) with little planning and the streets show no long-range order with obvious contrast to the consciously planned (as if cooled slowly) city of Phoenix. Note the dislocation at the low angle grain boundary in Long Island. The satellite image and maps are ©2009 Google.



ARIZONA PORTLAND CEMENT CO. - TUCSON, AZ





FIRESTONE HIGH SCHOOL 2002 - 2006