

Felice Frankel and the
Merger of Photographic Art and Science

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Felice Frankel says science and art are connected -- “If an artist delves, investigates, seeks answers and dissects things to their essence in the way a scientist does.”¹ Frankel is a science photographer and research scientist in the School of Science at the Massachusetts Institute of Technology. This paper will examine the evolution of her career in photography.

Born in 1945 in New York City, Frankel attended public schools where she says she was “spellbound”² by science. She eventually earned a degree in biology from Brooklyn College. Years of working as a research assistant at the Cancer Research Institute at Columbia University taught her the vocabulary of science that has “always been in my soul,”³ and helped to prepare her for a career of interdisciplinary communication.

Frankel began her work as a photographer by taking still shots for an expanding public television station. As construction for a new building was taking place, the architect asked Frankel to photograph it. Frankel accepted this task that would bloom into a new career as a landscape and architectural photographer. She says she “loved working with space and documenting details.”⁴

In 1992, as photographer for the award-winning book *Modern Landscape Architecture*, Frankel was awarded a Harvard Loeb Fellowship to study at Harvard's Graduate School of Design. This work gave her the science courses she

had missed. While attending a lecture in molecular biology, she approached the scientist who was “very visually oriented,”⁵ because she wanted to improve his pictures. George Whitesides, a National Medal of Science winner who was lecturing agreed to working with her, “It’s technically very demanding and not at all obvious how to take these pictures.”⁶

To make science interesting to people who are not technically detailed, Frankel suggested they put together “a wonderful picture”⁷ says Whitesides. In 1997, Whitesides and Frankel coauthored *On the Surface of Things*, a book that features a selection of her scientific photographs with commentaries written by Whitesides, to explain “why things work.”⁸ When introducing this book, the authors state that “Surfaces define the shapes of our world; light allows us to see them.”⁹ The images they selected for the book share four characteristics: color, form, and composition is attractive without knowledge of subject matter; they are nonrepresentational; they are unfamiliar; and they illustrate current scientific research.

Frankel learned about the special needs and constraints of scientific photography, and has worked to develop standards for visualization. Because taking color, texture, and light into consideration makes the photographs more interesting, Frankel makes observations that force scientists to take more control

over the physical system they are photographing.

In one example, Whitesides and his associates were studying drops of water separated by thin barriers, and Frankel suggested introducing dyes into the water. By doing so, Whitesides had a new piece of information: “Putting dyes enabled us to think about the question of whether there were small channels that allowed the fluids to leak from one drop to another without necessarily making a visible bridge.”¹⁰ Frankel wanted dyes to make the photograph more interesting, thinking back to her past as a landscape photographer, taught her “how to make a wonderful picture out of something not so wonderful.”¹¹

Frankel collaborates with scientists and engineers to create images for journal submissions, presentations and publications for general audiences. She is a Fellow of the American Association for the Advancement of Science which has described her work as taking science “from complex equations to bold and beautiful visuals... designed to spark public appreciation for science.”¹² Her career as a science photographer has also been rewarded by the Guggenheim Foundation and the National Science Foundation, the National Endowment for the Arts, the Alfred P. Sloan Foundation, the Graham Foundation for Advanced Studies in the Fine Arts, and the Camille and Henry Dreyfus Foundation.

The National Science Foundation book, *America's Investment in the*

Future, calls Frankel's photographic contributions “compelling visual metaphors for the scientific and technological advances”¹³ that enable the NSF to “communicate the dramatic impact of the basic research it advances.”¹⁴

Frankel was awarded a NSF grant for “Envisioning Science” where she worked with students and researchers to “raise the standards”¹⁵ in scientific imaging and developed a handbook for scientists to better communicate their research through “accurate and compelling images.”¹⁶ This project has also led to an initiative to promote a new collaboration of researchers, imaging experts, and science writers beginning with the 2001 Image and Meaning: Envisioning and Communicating Science and Technology conference.

The 2002 publication of *Envisioning Science* Frankel describes how Frankel uses the same principles as skilled photographers to create images: light, composition, and focus. It is about creating a “new kind of science image,”¹⁷ that communicates scientific work more effectively. The images in this book communicate science to the general public and inspire further investigation by those unfamiliar with the subject. Frankel asserts that by practicing techniques in this book, the images produced will become more useful in communicating, more compelling and accessible, and will expand ways the scientific research is envisioned.

Frankel describes ‘The Flatland’ as images that are two-dimensional renditions of three dimensions, and reminds readers that cues for depth are lost. She explains that creating order is the first step of making a successful image, and to only include the most essential components. When preparing the sample, consider that the first-time viewer sees everything, but if you are familiar with the image, distractions are mentally edited out, she says.

An interesting point she makes about centering and symmetry is to *not* center the important element in a photograph, because “it makes for an uninteresting image.”¹⁸ Frankel suggests making comparisons to something else - that if the viewer can compare the important component to something else, it helps “clarify what is essential and engages the viewer.”¹⁹ She explains that adding another component to a repetitive sample “helps define what you want the viewer to see and adds interest to an image.”²⁰

Another method of engaging the viewer is to suggest that what lies beyond the edge or border so the viewer can mentally complete the image. Frankel asks the reader to consider the space between the essential components of an image as a guide for the eye. She explains why there is “never only one way to light your sample”²¹ and suggests going beyond what is believed to be good lighting because small differences can improve a picture.

Frankel embraces two worlds in her work - scientific and aesthetic. She uses her camera to locate the “visual beauty of science research”²² that “seems to be kept secret”²³ and capture it with “technical accuracy that can add information and generate new ways of thinking.”²⁴ Throughout her career, Frankel has merged scientific observation and photographic art.

“One may view the images I take as artistic, but their primary purpose is to communicate scientific information”²⁵ says Frankel, describing artists as having a personal agenda and a “very particular”²⁶ point of view. She frames the images in a way that emphasizes the particular point of the investigation, and chooses only the essential components for communicating a specific idea.

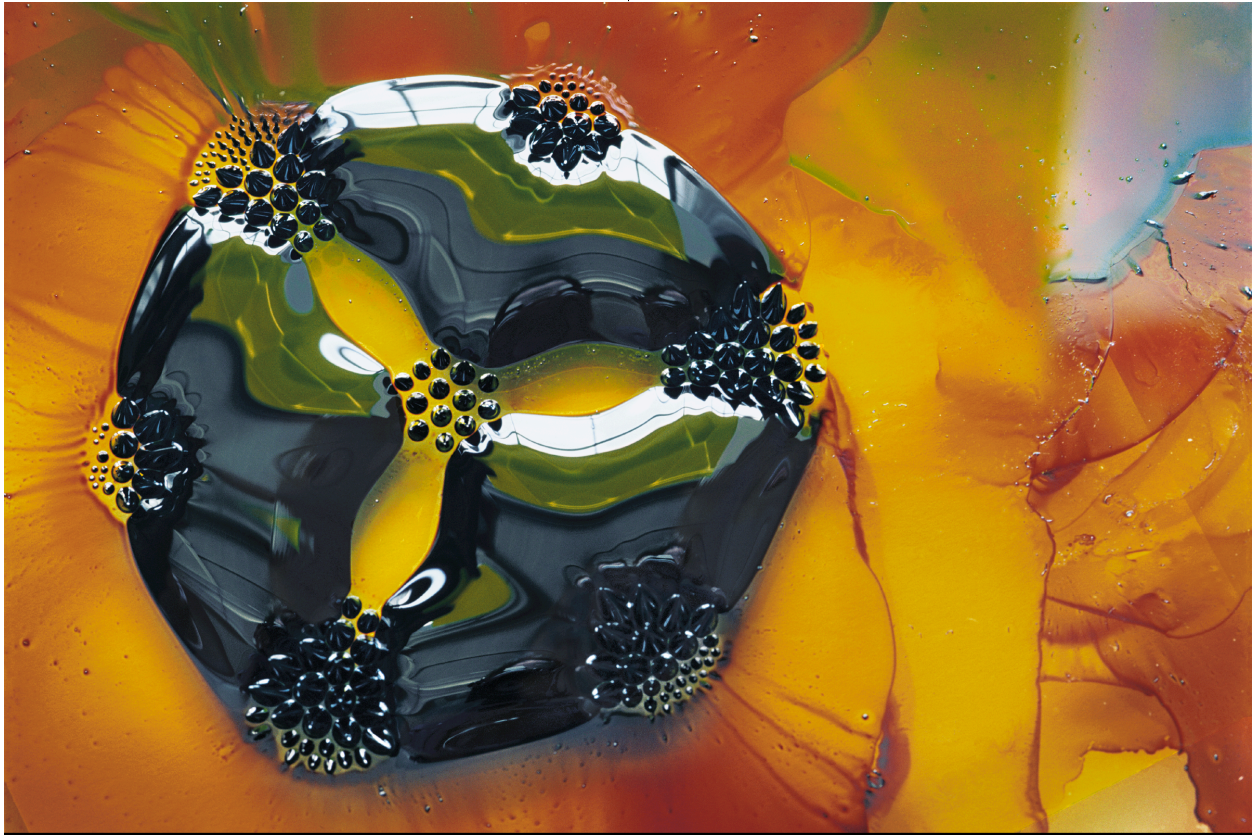
Endnotes

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5. David Chandler, "Scientific exposure" (Boston Globe, October 23, 1995) 45.
6. Ivars Peterson, "The art of scientific photography" (Science News, December 1997) 395.
7. Paul Solman, "Surface Art" (Online NewsHour with Jim Lehrer, July 20, 1998) 1.
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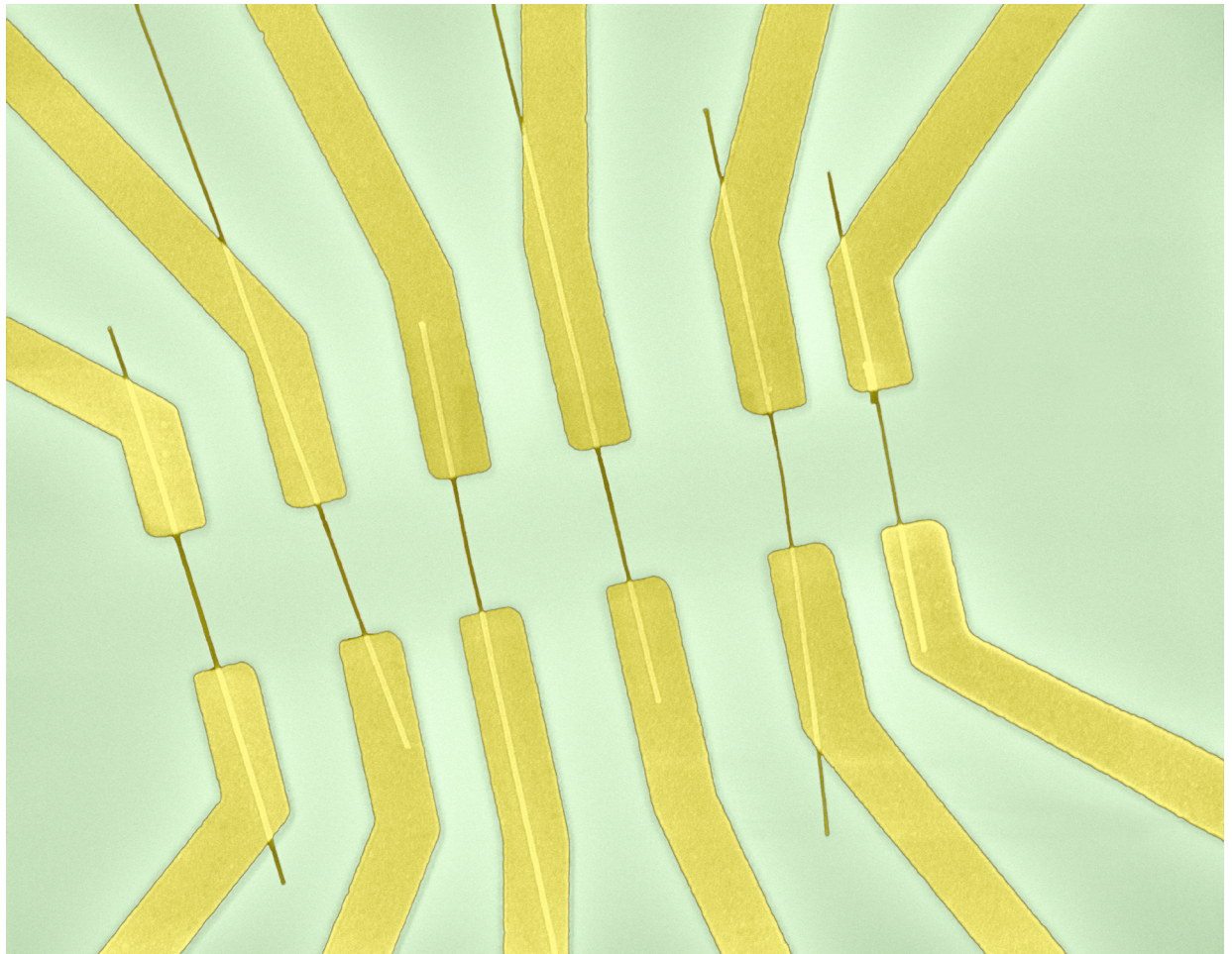
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Photos



Ferro fluid (copyright Felice Frankel)



Nano wires (copyright Felice Frankel)