Alfredo Alexander-Katz

Associate Professor of Materials Science and Engineering

B.S. Physics, UNAM (Mexico), 1998

Ph.D. Physics, University of California at Santa Barbara, 2004

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The Alexander-Katz Research Group (http://web.mit.edu/soft-materials)

Research:

Prof. Alfredo Alexander-Katz' doctoral work focused on understanding (http://www.npr.org) the self-assembly of copolymers using novel field-theoretical methods. As an NSF International Postdoctoral Fellow, he moved to Munich to study the dynamics of driven polymers. His work in Munich led to an important discovery that unraveled the mystery behind the process of blood clotting at high shear rates and opened new routes for the development of novel shear responsive materials. He later moved to the Ecole Superieure de Physique et Chimie Industrielle (Paris, France) as a CNRS postdoctoral researcher to study charged polymer solutions and their self-assembly with direct applications to fuel cells. His current interests lie in the realm of self-assembly and dynamics of biological soft-materials using a combination of analytical theory and simulations. His group is particularly focused in designing novel polymer-like drug delivery carriers and understanding their response to chemical and physical stimuli. This work aims to enable a new generation of drug-delivery vectors that could target different areas of the body in a very specific manner, and to provide a much deeper understanding of the processes of adhesion and targeting in flow. Other topics that he is currently pursuing is understanding the supramolecular self-assembly of chlorophyls in the antennas of Photosynthetic Bacteria which are the most efficient light harvesting organisms on Earth, as well as studying the dynamics of driven soft systems in general. The research in Prof. Alexander-Katz's group is highly interdisciplinary, and lies at the interface of materials, biology, physics, chemistry and medicine.

Related News | Publications

DMSE Faculty host summer undergraduate researchers
Friday, July 6, 2018 - 10:00am
From simulating the physics of spinning magnetic particles to fabricating new materials for infrared chemical sensing, MIT Materials Research Laboratory summer researchers will challenge themselves to learn new skills and develop new scientific insights.
A diverse group of top-performing...

2018 GMC Awards
Thursday, May 31, 2018 - 12:45pm
During the 2018 GMC Awards, Alfredo Alexander-Kats won Best Advisor and Niels Holten-Andersen won Best Teacher. Congratulations to both of them!

MIT News Profile: Alfredo Alexander-Katz
Sunday, August 28, 2016 - 1:45pm
Professor Alfredo Alexander-Katz was recently profiled by MIT News and featured on the MIT homepage! You can read a little about his path to MIT, as well as his past and current research by checking out the **MIT News... (http://news.mit.edu/2016/faculty-profile-alfredo-alexander-katz-0822)**

Modeling how colloidal particles spin through a fixed array
Friday, August 26, 2016 - 11:15am
MPC-CMSE Summer Scholar Jennifer Coulter interned with Professor Alfredo Alexander-Katz, working with him to create a computer-simulation of his spinning particles research.
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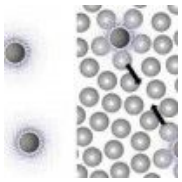
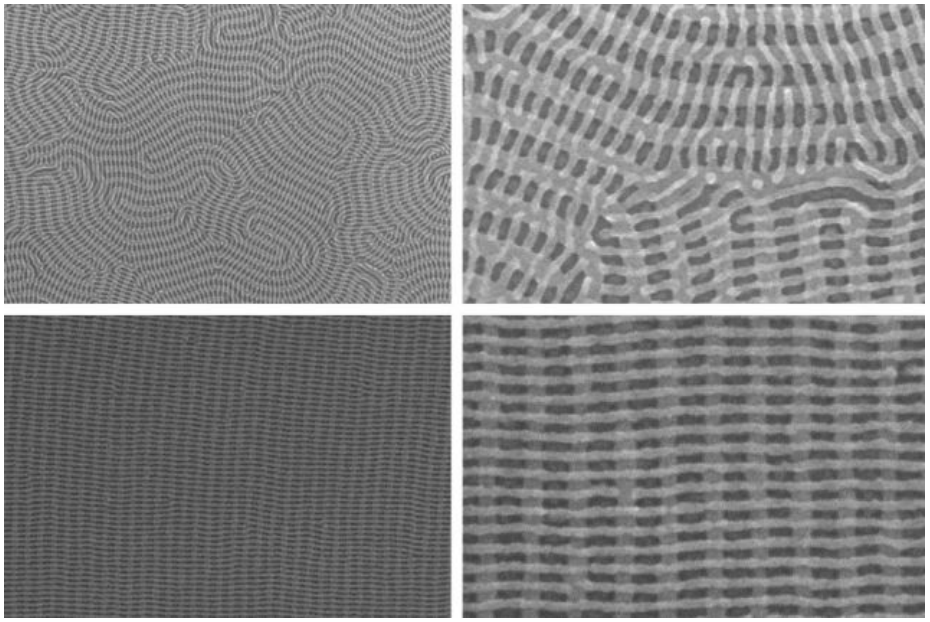


Unexpected long-range particle interactions
Tuesday, April 12, 2016 - 3:15pm
Moving bodies can be attracted to each other, even when they're quite far apart and separated by many other objects: That, in a nutshell, is the somewhat unexpected finding by a team of researchers at MIT. Scientists have known for a long time that small particles of matter, from the size...

Self-Stacking Nanogrids
Friday, January 29, 2016 - 11:00am

Members of DMSE have discovered a way to stack block-copolymer layers into neatly...

GMC announces 2015 awards
Monday, May 25, 2015 - 4:30pm
The Graduate Materials Council has announced the 2015 faculty awards.
Best Advisor is Prof. Alfredo Alexander-Katz
Best Teacher is Prof. Michael Demkowicz
The awards are determined by vote after all DMSE grad students have the opportunity to...

Newly tenured DMSE faculty
Wednesday, May 20, 2015 - 3:30pm
Please congratulate the two DMSE faculty who have been awarded tenure this year:
Alfredo Alexander-Katz, the Walter Henry Gale (1929) Career Development Professor in the Department of Materials Science and Engineering. His research combines theory and simulations to develop a deep...

Microscopic walkers find their way across cell surfaces
Wednesday, October 22, 2014 - 8:00pm
Technology could provide a way to deliver probes or drugs to cell structures without outside guidance. Learn more from the **MIT News Office (http://newsoffice.mit.edu/2014/microscopic-devices-walk-cell-surfaces-1023)**
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Gold nanoparticles in medical use
Sunday, July 20, 2014 - 8:00pm
Scientists explain how gold nanoparticles easily penetrate cells, making them useful for delivering drugs. See the **MIT News Office (http://newsoffice.mit.edu/2014/gold-nanoparticles-may-be-useful-for-delivering-drugs-0721)** for the full story.
...

Physics of Living Systems Group
Thursday, May 1, 2014 - 8:00pm
A common set of ideas and approaches brought together a trio of MIT professors and their research teams to form the Physics of Living Systems group, which opened a new lab and offices mid-April at 400 Technology Square, sixth floor.
The group co-located at 400 Technology Square includes...

DOE Early Career Awards Announced
Tuesday, May 7, 2013 - 8:00pm
Professor Alfredo Alexander-Katz is among the five MIT recipients of the 2013 **Early Career Award (http://science.energy.gov/early-career/)** of the Office of Science of the Department of Energy (DOE). The...

Faculty Promotions announced
Wednesday, February 20, 2013 - 7:00pm

Profs. Alfredo Alexander-Katz and Geoff Beach will both be promoted to the rank of Associate Professor as of July 1, 2013.
Please congratulate Alfredo and Geoff. The levels of research, teaching, and service excellence needed to reach this milestone are significant, and their...

How do wounds heal? Materials scientists are figuring it out.
Monday, January 7, 2013 - 7:00pm
Professor Alexander-Katz and his colleagues are working on understanding how blood clots after an injury, an understanding that may have future applications in medicine. See the **MIT News... (http://web.mit.edu/newsoffice/2013/how-to-stop-leaks-the-way-blood-does-0108.html)**

Innovative complex self-assembly
Wednesday, July 18, 2012 - 8:00pm
Professor Ross, Professor Alexander-Katz, and their collaborators have developed a new technique that allows production of complex microchip structures in one self-assembling step. See the story at the...

Self-assembled structures
Thursday, June 7, 2012 - 8:00pm
Professor Caroline Ross, Professor Alfredo Alexander-Katz, and their colleagues have found a new way of making complex three-dimensional structures using self-assembling polymer materials that form tiny wires and junctions. Learn more from the...

Self-assembled structures
Thursday, June 7, 2012 - 8:00pm
Professor Caroline Ross, Professor Alfredo Alexander-Katz, and their colleagues have found a new way of making complex three-dimensional structures using self-assembling polymer materials that form tiny wires and junctions. Learn more from the...

Research from Prof. Alexander-Katz results in new self-assembly method
Wednesday, December 16, 2009 - 7:00pm
Prof. Alfredo Alexander-Katz and his group have developed a new microscopic system that could provide a novel method for moving tiny objects inside a microfluidic chip, and could also provide new insights into how cells and other objects are transported within the body. See the...

Professor Hobbs holds an OBE, Order of the British Empire.