

By

Alexis Littlefield

Americans are familiar with China's rampant industrial espionage program, but they are often unfamiliar with [US government-funded cooperation](#) that serves a similar purpose for the Chinese—transferring sensitive intellectual property. This is why it is important that such collaboration receives scrutiny. Take the case of nano aquabots, an overlooked technology.

Nano aquabots are a dual-use technology that can both serve humanity and cause harm. Research on 3-lamellar morphology of miktoarm terpolymers is also dual-use technology. Manipulating the crystalline morphology in a non-fullerene acceptor (NFA) mixture to improve carrier transport and suppress energetic disorder is itself a dual-use technology. Ignoring all of the scientific language, it is important to understand that these are dual-use technologies.

All these technologies are funded in large part by the US government, in collaboration with the Chinese government and institutions. The dual-use nature of these examples is instructive. First, nano aquabots perform a variety of tasks in aquatic environments, ranging from environmental monitoring to targeted drug delivery within the human body. Weaponizing nano aquabots would lead to new and bizarre sci-fi warfare.

3-lamellar morphology of Miktoarm terpolymers have unique mechanical strength, thermal stability, and chemical resistance, which are pivotal in applications ranging from aerospace because of their lightweight yet strong components to biomedicine potentially revolutionizing certain medical treatments and interventions. The 3-lamellar morphology of these terpolymers paves the way for advancements in nanotechnology.

The primary benefit of manipulating crystalline morphology in NFA mixtures lies in the enhancement of carrier mobility. Energetic disorder refers to the variation in energy levels within a material. For example, this disorder can impede the performance of organic solar cells by trapping charge carriers and reducing their mobility. Suppression of energetic disorder advances stealth technology. It can also be used to harden electronics to withstand extreme temperatures, humidity, and other environmental stressors.

We are at the beginning of a multifaceted quantum revolution in science (MQRS). This multifaceted scientific revolution is fueled by its own discoveries in artificial intelligence, machine learning, quantum mechanics, and quantum computing. Imagine a hypothetical quantum battery that has the capacity to recycle its own energy as it continues to accelerate and deliver sustained power for exponential acceleration. The MQRS will, hypothetically, accelerate scientific discovery exponentially.

What are some of these facets that make this scientific revolution multifaceted? MQRS facets include revolutions in genetics, such as with techniques like CRISPR and gene therapy, biotechnology, nanotechnology, quantum mechanics, quantum computing, robotics, autonomous systems, space exploration, astrophysics, neuroscience, and brain-computer interfaces.

Unclassified research is available in peer reviewed academic journals such as the American Chemical Society's (ACS) *Nano*, *Synthetic Biology*, *Macromolecules*, *Small Science*, *Emerging Microbes and Infections*, *Immunological Reviews*, *Journal of Computational Physics*, *Advanced Science*, *Advanced Materials*, *Advanced Electronic Materials*, and many more. Funding research trickles down from the [Department of Energy](#) to labs such as the [Oak Ridge National Laboratory](#), which, since 2000, is operated by the University of Tennessee and the [Battelle Memorial Institute](#).

Other partners and funding include the Army Research Office, the Air Force Office of Scientific Research and [Basic Energy Sciences](#). Partners on the Chinese side include Hong Kong's [Research Grants Council](#), [University Grants Committee](#), [Croucher Foundation](#), Beijing's [National Natural Science Foundation of China](#) directly under the administration of the PRC's [Ministry of Science and Technology](#), and the Foreign Technology Cooperation Plan of Guangzhou, China.

This sensitive and advanced research has the blessing of the US Congress under the US-China Science and Technology Cooperation Agreement (STCA). Under this legislation, Congress requires the Departments of State, Defense, and Commerce and the Central Intelligence Agency to report to Congress biennially on how the US-China STCA benefits the PRC economy, military, and industrial base, including the role of technology transfer and compliance with American export controls. According to the Congressional Research Service's (CRS), [Karen M. Sutter and John F. Sargent Jr.](#), "These reports have not been public; some that have been made public through Freedom of Information Act requests mostly do not provide the required assessments."

The United States sees this as a tool to foster ties, address climate change, and advance science for overall well-being. According to Sutter and Sargent's [report](#), the benefits to American researchers is that they have access to large pools of research subjects and longitudinal health studies from China. This also means that Chinese researchers have access to American medical data, from databases such as those acquired through the 2013 [BGI-Shenzhen acquisition of US-based Complete Genomics](#). Also noted in the CRS report, as China develops domestic scientific competencies, it increasingly seeks to restrict US access. In 2019, China cut off US access to coronavirus research, including US-funded work at the Wuhan Institute of Virology. China withheld avian influenza strains required for American vaccines.

The MQRS will potentially accelerate until it hits an unforeseen black swan of a brick wall. China's intentions toward the United States are not of the black swan variety; instead, they are of the plain-as-day white swan variety that Americans choose to ignore. And this is at a time when risks and rewards of the MQRS are growing more pronounced.

In short, Congress should remove China from its Science and Technology Cooperation Agreement. Americans should not take part in driving Chinese technical expertise forward. American tax dollars are also assisting China's AI-driven research in advanced fields such as energy-dissipative evolutionary deep operator neural networks. Such work has application to military purposes. It would be foolish to believe the Chinese will not use all of the technologies discussed here to further their advantage over the United States.

China wants to overturn the liberal international order. American naivete is one way to make sure they succeed.

Alex Littlefield, PhD, is the Chief of Staff at the National Institute for Deterrence Studies and a Fellow of the Institute. He spent more than two decades in Taiwan and China.