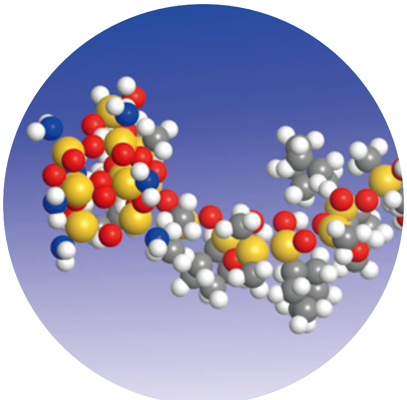


A new silicon resin whose structure allows high temperature resistance

CHEMISTRY LOOKING BENEATH THE SURFACE

HIT's School of Chemistry and Chemical Engineering (SCCE) is among the first of its kind in China. Leveraging an almost 90-year history in applied chemistry, it has made major contributions to developing chemical engineering materials for many uses.

One SCCE team has developed silicon resins with excellent electromagnetic and mechanical performance. Able to withstand temperatures of 600 °C, the silicon matrix composites set a new record in heat resistance, ideal for aerospace applications. Other breakthroughs in novel aerospace materials include fabricating functional surface coatings for spacecraft, growing a large optical crystal yielding a strong laser output, and enabling eco-friendly, low-cost and scalable production of aerogel insulation materials.

In energy materials, SCCE's invention of nickel foam technology marked a milestone for rechargeable batteries. Studies on oxide cathode materials helped produce high-performance lithium-ion batteries. Researchers have also developed inexpensive platinum-free novel electrocatalysts for use in proton exchange membrane fuel cells.

SCCE's surface and interfacial chemists were the first to synthesize a novel super-hydrophobic buoyant material. Its capacity was demonstrated by the production of aquatic microrobots capable of walking and jumping on water.

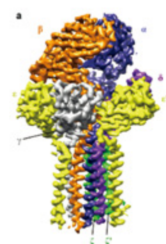
LIFE SCIENCES EXPLORING THE STRUCTURES OF LIFE

Integrating research with education, HIT's School of Life Science and Technology (SLST), and the HIT Center for Life Sciences (HCLS) have advanced rapidly.

Led by SLST professor, Zhiwei Huang, a team has determined the crystal structure of a ligase complex in the HIV virus, providing the structural basis for understanding how the antiviral activities of human viral restriction factors are disrupted. Their revelation of the molecular mechanism helps build a foundation for designing novel anti-HIV drugs.

Huang's team has also revealed, through high-resolution, cryo-electron microscopy, the structure of a complex responsible for antigen recognition in T cells, which mediate immune responses. Unveiling the assembly of the T-cell receptor apparatus, the discovery enhances understanding of the mechanism that triggers immune responses of T cells, informing the design of immunotherapies targeting the complex.

These discoveries are supported by SLST and HCLS. As HIT's first special academic zone, HCLS enjoys freedom in research, hiring, and financial decisions within the university, and has established state-of-the-art core facilities including cryo-electron microscopy, imaging, mass spectrometry, antibody platforms and SPF animal room.



3D reconstruction and atomic model of the human TCR-CD3 complex

An artistic visualization of the Space Environment Simulation Research Infrastructure (SESRI)

SESRI BRINGING SPACE TO EARTH

Simulation tests provide vital information about what is possible in the harsh space environment. At HIT, a large-scale space science and technology experimental platform, the Space Environment Simulation and Research Infrastructure (SESRI), is under construction, offering a wide array of simulation test capabilities.

SESRI leads the world in simulation capability for nine space environment factors, including particle irradiation, solar electromagnetic radiation, high and low temperatures, thermal cycling, high-speed dust, plasma, vacuum, and zero magnetic fields. Its multi-parameter systems enable dynamic measurements and *in-situ* analysis of structural, performance and functional changes of materials, devices, and living organisms. The facility also allows for reconstruction of extremely weak magnetic fields and their measurement, and studies of physical processes related to Earth's magnetosphere. Results from ground-based experiments on SESRI can be coupled with satellite observations, advancing understanding about the physics of space.

SESRI is expected to open to users from across the world in 2022.

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