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SWALLOWTAIL butterflies have been the subject of study in development of Aerospace and solar energy. Photos by: Award winning photographer, INGO ARNDT



Our natural world continues to reveal valuable clues in how we can use and manage the resources found on earth.

A Vanguard rocket placed the first orbital object into space that contained a series of small solar panels that powered a tracking device for a short time. The Vanguard Satellite is still in orbit and will turn 55 years old on March 17, 2013.

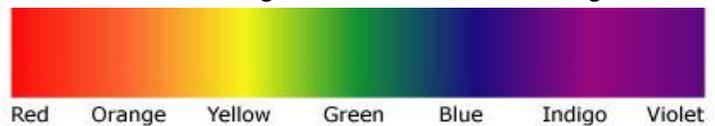
By 1990 contaminated air in the cabin and space capsule living quarters had been cleaned by use of catalytic converters that could remove the emissions and then recirculate the air safely. The catalytic converter was then adapted to industrial and automotive emissions control.

In March of 2012 a scientist presented a paper at the 243rd American Chemical Society's National Meeting and Exposition, held in San Diego, California. The subject of his paper is significant for it shows how to develop materials by studying microscopic images of the wing of a butterfly and producing large scale models for further research.

The question of how a butterfly can maneuver so quickly and stay warm may have been of interest to the scientist. **Dr. Tongxiang Fan** is a materials scientist and has done ground breaking studies in Functional Ceramics, Bio-inspired Materials, and Bio-mimetic Materials. The study of butterfly wings revealed patterns in the wing structure that mimic shingles on a house roof. On each shingle there are patterns of open holes that have walls that reflect to receive long wavelengths of light and allow shorter wavelengths to filter through to the membrane below. **Dr. Fan** built solar panels that mimic the butterfly wing structure and created greater energy output.



There are many wavelengths of light in the color spectrum that humans cannot see. There are some that are too short to see. This wavelength is "Ultraviolet" light. The wavelength that is too long to see is called "Infrared" light. Humans can see wavelengths of 400-700 nanometers or a color range of red through violet. Long wavelengths of Infrared light radiate heat, we cannot see it, but we can feel it. Stand close to a stove or camp fire and you will experience Infrared light.



By combining titanium dioxide using their model with platinum nanoparticles the researchers were able to boost their output capacity and to separate water molecules. The result was a large increase in hydrogen gas produced from water. Hydrogen is a renewable energy source produced from water and light.

This form of renewable energy is being further studied for potential in propulsion, in sterilization of medical instruments, more efficient catalytic converters developed from lighter weight material, and creating more efficient air purification systems for all forms of housing and transportation needs. The butterfly wing surface is also of interest for aircraft surfaces, structure, air purification, and water proofing.

The butterfly technology is a new discovery that will renew the work that has gone on before in the pioneering of space exploration, and hundreds of other Aerospace and industrial applications.

