

UF Hosts International Symposium While Professor Celebrates 25 Years of Research

If we wish to understand life and the world around us we must get to the surface of things, said an international gathering of scientists who visited the University of Florida campus in August.

More than 20 countries were represented by the best minds in surface science during the Center for Surface Science & Engineering's International Symposium on Micelles, Microemulsions and Monolayers: Quarter Century Progress & New Horizons August 28 - 30. The symposium coincided with 25 years of surface science research and the 25th anniversary of Dinesh O. Shah's arrival at UF.

Shah, symposium chairman and host, is the director of UF's Center for Surface Science and Engineering and is a professor of both chemical engineering and anesthesiology. He said the

major thrust of surface science is the study of the interfaces between materials.

Surface scientists aim to provide information about such things as paint coatings, industrial soaps, pharmaceuticals, biological membranes and technologies that involve petroleum removal from depleted oil fields.

Emory University chemistry Professor F.M. Menger, plenary lecturer for the micelles segment of the symposium (micelles are clusters of single molecules or aggregates of surfactant molecules), said understanding colloidal interactions is at the root of science.

"Ultimately, colloid chemists will have the upper hand in comprehending the products and processes of nature," Menger told the international gathering. "And what we have learned about micelles can be applied to all colloid chemistry."

Menger said he believes colloidal scientists will be at the forefront of science in the coming decades.

"Colloid chemistry in general is the wave of the future," he said. "Sooner or later it is going to dominate bioengineering because living systems are colloids."

Menger predicts that all scientists will come to rely on the analytical ability of colloid chemists, no matter what the question.

"They can determine the human genome but they still won't understand life until they go to the colloidal state," he said.

Professor Bjorn Lindman of Lund, Sweden was an invited lecturer at the symposium and has hosted like-gatherings at the University of Lund. He said surface science is a hot topic overseas.

"In Europe it's quite big," Lindman said. "It's basic research, but it's all the time relevant because we see it applied in the pharmaceutical formulations that make delivery systems sustained (time) released."

Although surface science technology is linked to the human body, it also has industrial applications, Lindman said.

"We want to develop new systems to replace the petrochemical based systems with new polymers and surfactants, which are based on renewable resources," he

said, indicating the seriousness of European environmental concerns. "That's the aim, to find new products that will replace the harmful ones. That's the pressure from society, to find these things."

Professor Krister Holmberg, also from Sweden, said microemulsion technology already is working on better extraction methods at oil wells. He said Shah is a pioneer in this area and that the technology has been available for some time.



Professor F.M. Menger delivered the plenary talk at the beginning of the three-day conference.

Dinesh O. Shah points to an item of interest for one of the scientists attending the symposium.



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Holmberg explained that oil droplets become lodged in rock crevices deep within wells. In order to remove the trapped oil, a surfactant must be added to water that will cause oil and water to marry, instead of separate. Then, when water is pushed through a well, it will carry the oil with it.

"So, by changing the surface tension with a microemulsion, the oil is easier to push up," Holmberg said. "When you add a surfactant to water and oil, it acts as an interface. It occupies all the interfaces and makes water and oil come together to form a homogeneous solution."

Holmberg said the surfactant can be recycled after it is removed from the harvested oil, but is commonly left in. This technology, according to Holmberg, is mostly used in Texas and around the world for field testing. It is a costly procedure. He said as long as oil prices remain under \$20 a

barrel, this surfactant technology will "remain on the back shelves at the oil companies."

But some surface technologies are being used regularly such as the Shah research team's invention of artificial tears.

Shah explained that normal eyes are coated with a thin layer of fat that prevents moisture from evaporating too rapidly. Sometimes eyes can lose their ability to produce this coating, causing a person to blink more frequently. The UF research team developed a new teardrop additive that artificially supplies the fatty film that allows patients' eyes to react normally.

Shah said serving people through science that can benefit them directly is what his research is all about.

"We have done some fundamental research, but with an eye toward application," Shah said.

