

Liquid crystals are a kind of matter exhibiting properties of both liquids and solids. They have long history in a range of being used as responsive materials in a range of technologies, perhaps most obviously in the now-ubiquitous LC display. Conversely, recent effort has been focussed on the design of LCs as materials that respond to targeted chemical and biological species.

Title: Colloid-in-Liquid Crystal gels as a substitute for Crab's blood for diagnostics!

From Dr. Santanu Pal's Group at Indian Institute of Science Education and Research, Mohali, Email: skpal@iisermohali.ac.in Mobile: +91-9501047835

World over, Crab's blood is used by pharmaceutical companies, medical device and food-testing industries to test bacterial contamination. This involves biological components and also leads to the death of around 10-15% of the crabs whose blood is extracted. Scientists at IISER Mohali have come up with a new way to test bacterial impurities (endotoxin) using LC gel which is cheap, easily available, easily prepared, portable and a robust device and if commercialized could change the fortunes of the pharmaceutical and other industries all over the world.

Dr. Pal believes that Crab's would still appreciate not having to donate blood quite so often.



Colloid-in-Liquid Crystal Gels that Respond to Biomolecular Interactions
S. K. Pal, N. L. Abbott, and co-workers

CITY ANCHOR WORLD OVER, THE CRAB'S BLOOD IS USED BY PHARMACEUTICAL COMPANIES, MEDICAL DEVICE INDUSTRIES AND FOOD-TESTING INDUSTRIES

Liquid crystal gel could replace horse-shoe crabs in tests

GAGANDEEP SINGH DHILLON
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LIQUID Crystal gels could soon replace horse-shoe crabs in medicinal testing if a recent research by scientists at Indian Institute of Science Education and Research (IISER) bears fruit.

Horse-shoe crabs, an endangered species, are strange-looking creatures that belong to the family of spiders and scorpions. World over, crab's blood is used by pharmaceutical companies, medical device industries and food-testing industries to test bacterial contamination. Not only is the test an expensive one, but it also leads to the death of around 10-15 per cent of



Santanu Kumar Pal with his students Shilpa Setia (left) and Sumytra Sidiq at IISER, Mohali.

the crabs whose blood is extracted. Excessive harvesting of horse-shoe blood has led to a decline in their population, according to in-

formation available on the internet. Scientists at IISER, however, have come up with a new way to test bacterial impurities—a liquid

crystal gel. Liquid crystals are a kind of matter exhibiting properties of both liquids and solids. They are used in Liquid Crystal Display (LCD) screens, among other things.

A team comprising assistant professor Santanu Kumar Pal and his students Sumytra Sidiq and Shilpa Setia, in collaboration with Nicholas Abbott of Wisconsin University have recently developed an LC gel which can detect endotoxins, that is the toxins present inside a bacteria. Their research study was first published last year in *Small*, an international science journal, after which they started working on improving the sensitivity of the LC gel.

Pal, while talking to *Newsline*, said that the LC gel is cheap, easily available, easily prepared, portable and a robust device, which if commercialised, could change the fortunes of the pharmaceutical and other industries all over the world. He said that after LC droplets were found to be responsive to endotoxins in a 2011 study by Abbott, scientists the world over had been trying to come up with a robust device which could detect these impurities.

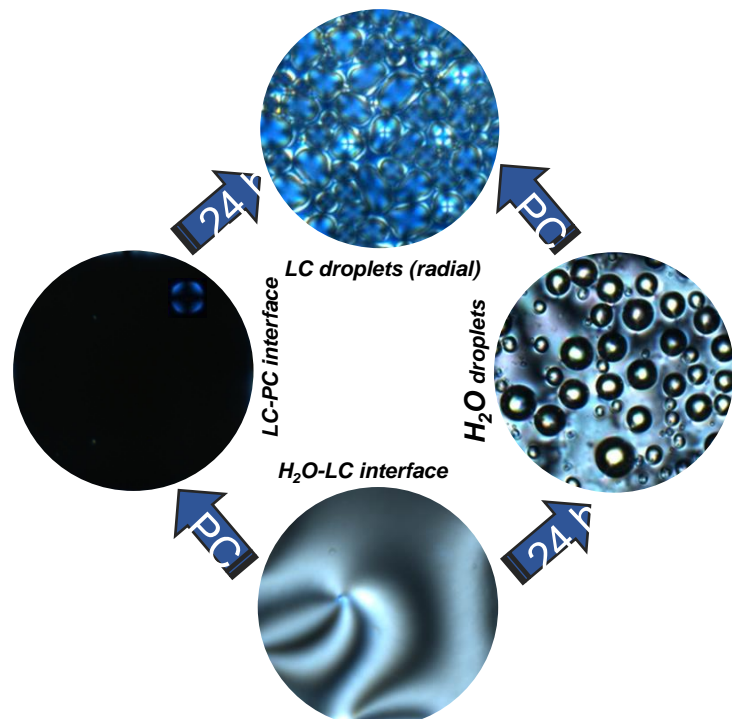
The only constraint, however, is that the sensitivity of the LC gel, as of now, is less than that of conventional testing methods. "The research work was just the beginning. We are now working hard on

improving upon the method and increasing the sensitivity of the gel so that it is at par with the sensitivity shown by the blood of horse-shoe crabs, and it is expected to happen in near future. If this method is adopted by the industry, it will not only benefit their finances but also help save the endangered horse-shoe crabs," said Pal. World over, four species of horse-shoe crabs are found, of which two are in India. When the crabs are taken for testing, 30 percent of their blood is extracted, after which they are left back in the sea. Their blood contains a clotting agent which provides a fast, reliable test for the presence of infectious bacteria in drugs and surgical instruments.

23rd June, 2014, The Indian Express

Title: A new technique to the development of LC droplets for medicinal testing!

Indian Patent Application No. 102/DEL/2014 dated 14.01.2014



LC droplets have found to be highly sensitive to endotoxins but droplets possess limited stability of just few hours and, therefore, could not be put to practical use. Dr. Pal and his group at IISER Mohali have come up with a new technique to develop stable and uniform liquid crystal droplets that enhances sensitivity and provide cheaper alternative to various forms of testing including detection of various diseases, chemicals and medicinal testing.