

Fever can be visualized soon

April 13, 2017 | News

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A team of scientists at the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, near Chennai are working on developing a visual, non-invasive method of monitoring body temperature of patients without using a thermometer.

The concept is based on ferrofluid emulsion contained in a thin film that changes colour with rise in temperature within a narrow range — 30-40° C. The emulsion has iron oxide nanoparticles containing oil droplets dispersed in water. In the presence of a temperature-sensitive polymer, poly(N-isopropylacrylamide) or PNIPAM, the ferrofluid emulsion can be used as a thermally tunable grating to produce different colours.

This is a first of its kind approach where the grating spacing can be tuned either by changing the temperature or by changing the magnetic field strength. Up to about 34° C, the polymer is highly hydrated and swollen due to repulsive interaction between individual monomer segments. But when the temperature crosses 34° C, the polymer becomes dehydrated leading to a collapsed state. The polymer once again becomes hydrated and swollen when the temperature falls below 34° C.

When polymer is added as a stabiliser and the temperature is increased, the grating spacing of the polymer changes and gives rise to a different colour or spacing. If the normal temperature is fixed at yellow, the change will be to green when the temperature increases. Colour with higher wavelength is produced at lower temperature and colour of lower wavelength at higher temperature.