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Scientists find a way to simulate quakes in lab

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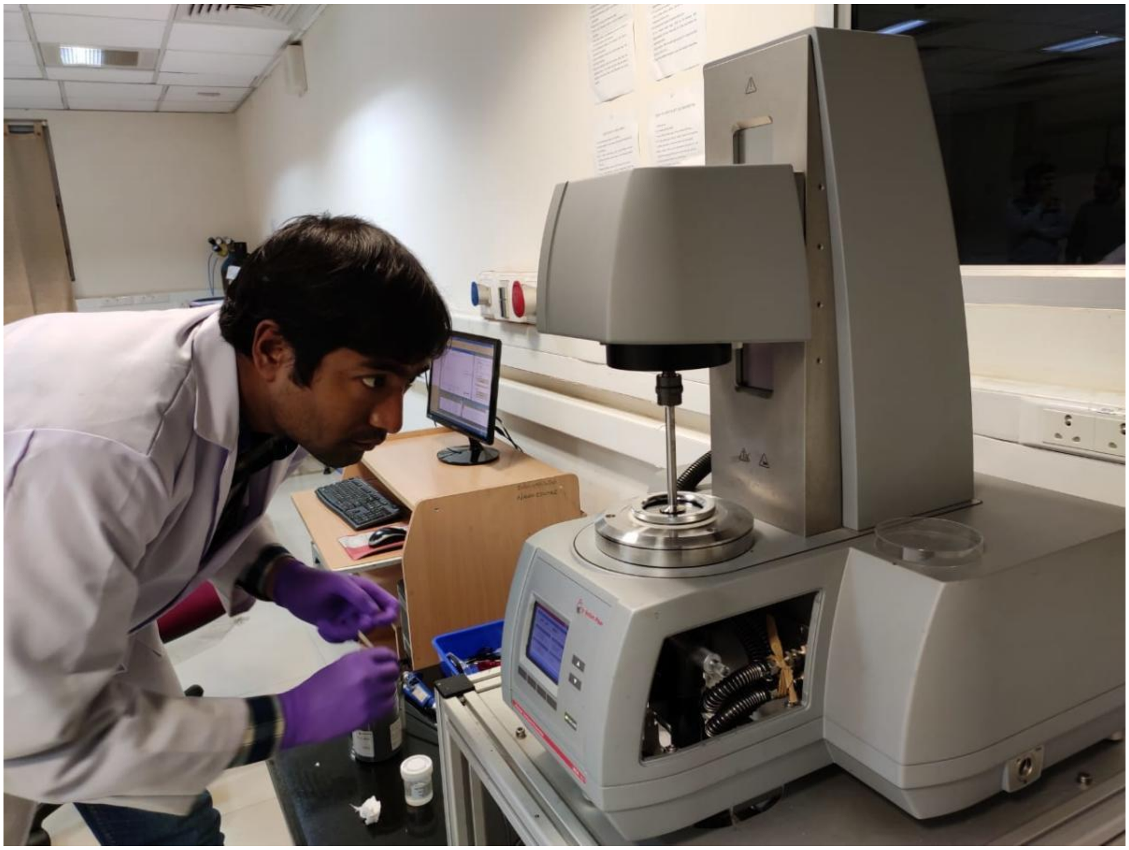

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A study by Bengaluru, France and Zurich-based researchers has determined a way to replicate how earthquakes affect the earth's crust, which could help identify microscopic precursors of earthquakes.

Working with two distinct soft gel materials such as soap-like molecules and a glass gel hewn out of clay nanoparticles, researchers from the Indian Institute of Science (IISc), the Raman Research Institute (RRI) and ETH Zurich discovered that these materials reorganise themselves in a manner similar to how the earth's crust is restructured during earthquakes.

Earthquakes typically occur due to friction between the earth's tectonic plates, releasing bursts of energy that severely damages the environment.

Pradip Bera, a PhD student at IISc and first author of the study, said the discovery was made accidentally when soft material was sheared between two steel plates.

The finding, the culmination of a decade-long project, is now set to dramatically alter how earthquakes are simulated under laboratory conditions. Right now, scientists are still unable to predict earthquakes or its intensity.

The research sees scientists applying force to rocks or ceramic materials to study how they deform and crack under stress. However, as these materials are solids, it is difficult to determine the changes that take place shortly before they crack open.

“No one can probe the domain structure directly. We could not see what was going on inside the material,” said Sayantan Majumdar, associate professor at RRI.

Dr Ajay Sood, senior author of the paper and DST Year of Science Chair Professor at the Department of Physics, IISc, explained that when soft materials were used, they generated burst-like patterns over time that resemble seismograph data generated by earthquakes.

Using an optical microscope and camera, researchers were able to look closely at how the inside of the material changed over time. They found that the rate at which the material reorganised itself showed burst-like patterns persisting over thousands of seconds, resembling seismic foreshocks and aftershocks. “We were able to observe this phenomenon at about 10 micron scale length. That is a huge advantage,” said Bera.

The paper was published in ‘Nature Communications’.