

## SCIENCE

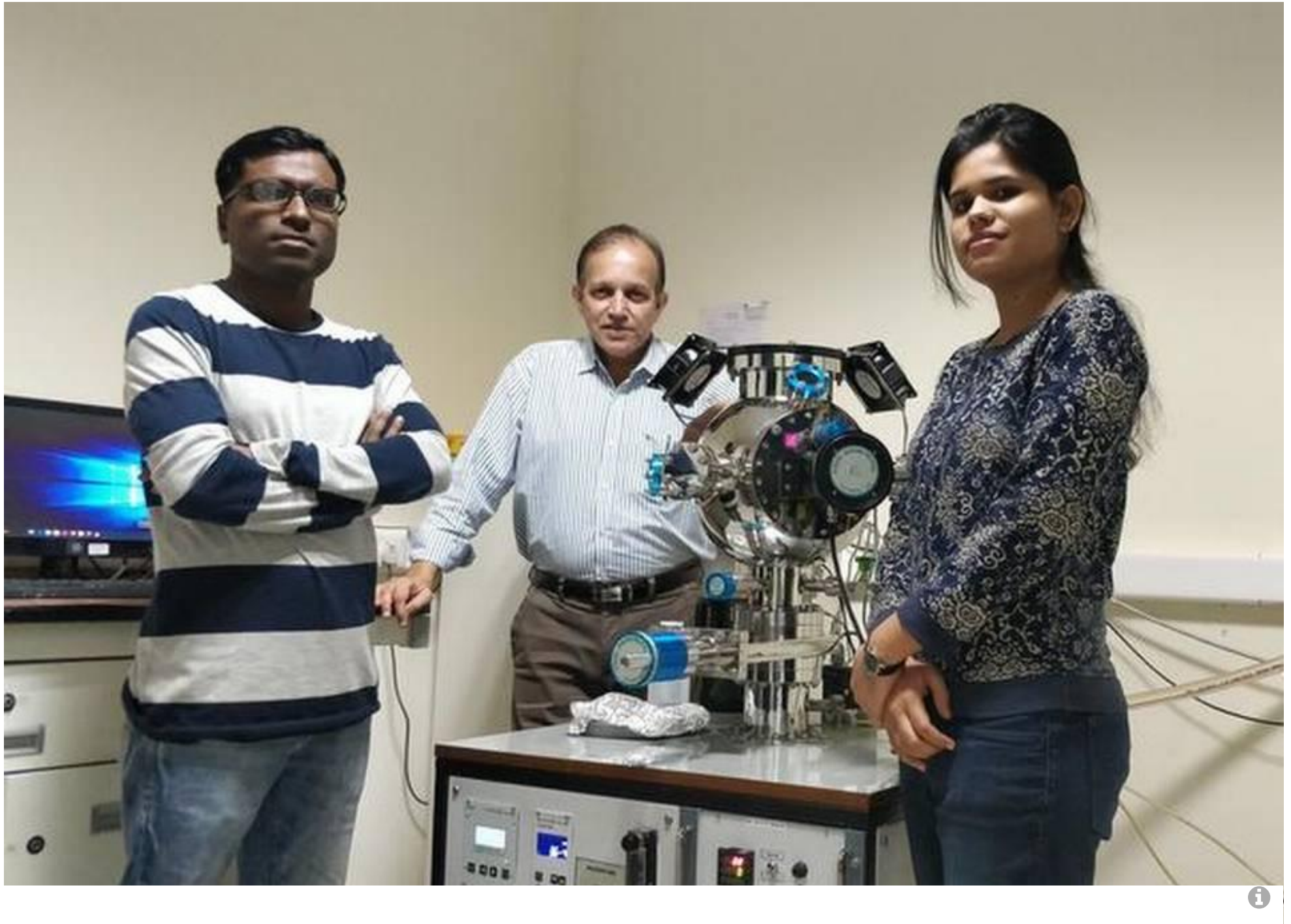
## IISc superconductivity claim gets another jolt as IISER Pune finds no superconductivity

**“We did not see any such drop in magnetism, thus confirming the absence of any plausible superconductivity, at least in our thin films,” say researchers.**

In the light of the [superconductivity claims](#) made by a two-member team of Dev Kumar Thapa and Prof. Anshu Pandey from the Indian Institute of Science (IISc) Bengaluru, researchers from the Indian Institute of Science Education and Research (IISER) Pune did not find any signs of superconductivity in gold-silver nanostructured thin film samples that they prepared in the lab. The preprint results were [posted in the arXiv server](#) on September 3. The preprint posted at *arXiv* is yet to be peer-reviewed.

The films were grown at room temperature and in vacuum (about  $10^{-6}$  mBar) by alternate deposition of gold and silver on crystalline silicon and quartz substrates. The nanostructured thin films of gold and silver was deposited using a very different technique – pulsed laser deposition – than the one used by the IISc team. Gold and silver were deposited sequentially, with more gold deposited than silver, for about 100 times so that the total film thickness is about 80-100 nanometres.

“Since their material is stated to be an Ag [silver] incorporated in Au [gold] configuration, we thought of making such Au/Ag modulated configuration by another method that can be easily reproduced and tested in any lab,” a team led by Prof. Satishchandra Ogale from the Department of Physics and Centre for Energy Science at IISER, Pune writes. The IISER team comprised of Abhijit Biswas and Swati Parmar.



**R. Prasad**

CHENNAI, SEPTEMBER 03, 2018 18:00 IST

UPDATED: SEPTEMBER 04, 2018 11:28 IST

**Nanostructured thin films**

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“Our intent was not to try and compare our material with theirs. The IISc team claims to have found superconductivity using gold-silver nanostructured material. So we made nanostructured thin films of gold and silver using a very different technique,” says Prof. Ogale. “Though the state of our sample could be very different from the IISc study, the material used is the same and it is nanostructured too. And we did not observe any superconductivity.”

“The objective of the study is not to compare, criticise or support the IISc team’s claims. Our study was to see whether we observe superconductivity at any temperature in a nanostructured gold-silver thin film synthesised by the method we employed. We did not see superconductivity,” Prof. Ogale explains.

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The IISER team with the help of Dr. Ram Janay Chaudhary of Consortium for Scientific Research at Indore, tested if the thin films showed any drop in the magnetisation or resistivity in the temperature range 5K to 300 K (-268 degree C to 27 degree C). “If the thin films showed superconductivity then we must have observed a drop in magnetism (diamagnetic signal). We did not see any such drop in magnetism, thus confirming the absence of any plausible superconductivity, at least in our thin films,” he says.

## No signature of superconductivity

A material is said to exhibit superconductivity when it is able to conduct electric current with zero resistance. Forget about resistivity dropping to zero, the IISER team did not even see any drop in resistivity throughout the temperature range measured (5K to 300K).

“We did not see any signature of superconductivity in either resistivity or magnetism measurements,” he says. The IISc team claimed to have observed superconductivity below 236 K (-37 degree C).

“The IISER Pune study result is not too surprising. People do not believe the IISc team results anymore,” says Prof. Pratap Raychaudhuri from the Superconductivity Lab at Tata Institute of Fundamental Research (TIFR) Mumbai. “Though the IISER Pune team prepared their samples in a different way and the microstructure is different, normally the superconductivity should not disappear. Even when less optimal material is used, the superconductivity [that is robust at room temperature in the IISc study] can only reduce or degrade but cannot be completely absent. It is quite unusual.”

“It is heartening that they [IISER Pune] did the experiments and reported their results. At the same time, too many people don't expect it to be otherwise,” says Prof. Raychaudhuri.

“Thapa Pandey and IISc should realise that there is a much bigger question here than reproducibility alone. The **repeated noise** has raised uncharitable doubt, which despite my own charitable explanation (as well as some subsequent ones), will not fade away till it is explained by the authors,” Prof. Raychaudhuri says in a [Facebook post](#).

## A letter from the Editor

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Dear reader,