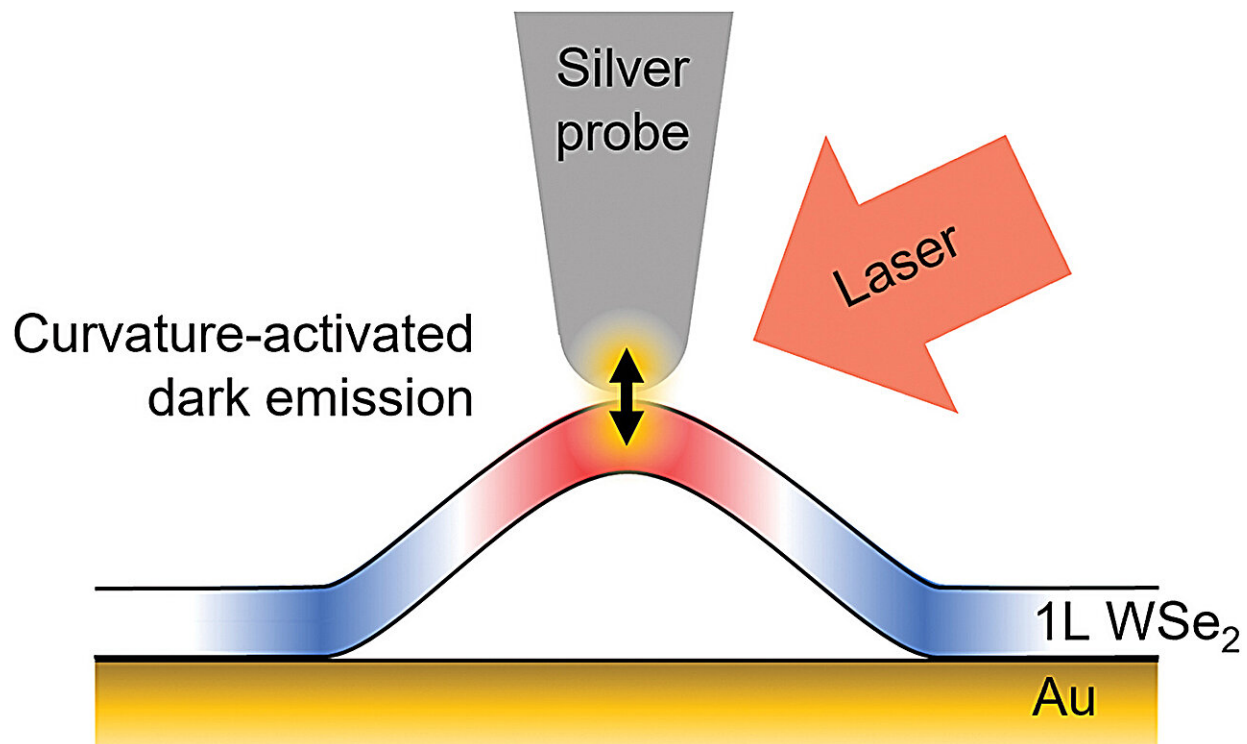


Advanced measurements unravel nanoscale phenomena in tungsten diselenide

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Credit: *Science and Technology of Advanced Materials* (2023). DOI: 10.1080/14686996.2023.2278443

Semiconductor 2D materials are a few atoms thick, and some of them exhibit localized emission, where light is emitted from such a small part of the layer that only one photon at a time is produced. This localized emission has unique properties and is vital to new quantum technologies,

especially in optoelectronic and quantum device applications.

Research has shown that stretching a 2D material called tungsten diselenide can result in localized emission, and many efforts have sought to create nanostructures with the maximum strain in the layer. However, advanced measurements at NPL indicate that bending the material can have a similar effect.

In [work](#) recently published in *Science and Technology of Advanced Materials*, scientists at NPL propose that curvature of 2D material resulting from wrinkles in the 2D layer is a better way to engineer the properties.

The effects of stretching and bending are not always easy to distinguish, but by combining advanced measurement techniques, their results show that this alternative paradigm is a promising route toward room-temperature quantum light sources.

Curvature is much easier to engineer than stretching strain and so this result could accelerate progress towards low-cost quantum technologies.

NPL is currently working with groups in the U.K. and Brazil to do quantum chemical modeling and further [experimental work](#) to test the proposed paradigm and develop the theoretical understanding of how geometric [curvature](#) results in localized emission in monolayer tungsten diselenide.

Department Head of Science Professor Fernando Castro said, "This work is a great example of how bringing together teams with expertise in different areas of materials and measurement science has resulted in a new way of understanding localized emission in advanced 2D materials semiconductors, opening new opportunities for optoelectronics and quantum applications."

More information: Sebastian Wood et al, Curvature-enhanced localised emission from dark states in wrinkled monolayer WSe 2 at room temperature, *Science and Technology of Advanced Materials* (2023). [DOI: 10.1080/14686996.2023.2278443](https://doi.org/10.1080/14686996.2023.2278443)

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