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RESEARCH ARTICLE · PHYSICS

Topological Signatures in Strain-Engineered Transition Metal Dichalcogenides

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ABSTRACT

We report a systematic angle-resolved photoemission study of strain-engineered MoS2 and WSe2 monolayers grown by chemical vapour deposition. By tuning the biaxial strain magnitude between -1.2% and +1.8%, we map the evolution of the valence-band spin splitting at the K point and identify a topological phase transition boundary near +0.6% tensile strain. The observed band inversion is corroborated by first-principles density functional calculations including spin-orbit coupling, and is consistent with the emergence of a quantum spin Hall regime at cryogenic temperatures. Our findings open a scalable pathway toward room-temperature topological devices based on solution-processable two-dimensional crystals.

Keywords: *topological insulators, transition metal dichalcogenides, strain engineering, spin-orbit coupling, ARPES*

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Abstract

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1. Introduction

This article was published by Eleventh Press International Journal of Multidisciplinary Research under a double blind peer-review model. The full text of the manuscript has been deposited alongside this record and is available via the galley links.

2. Methods

Methodological detail is preserved verbatim from the accepted manuscript. The production service has rendered this HTML, PDF, and JATS galley using Pandoc 3.1.11.1 and WeasyPrint with the journal's house CSS template.

3. Results

The findings, figures, and tables of the original submission are reproduced here. Readers should consult the PDF galley for the authoritative typeset version.

4. Discussion

By tuning the biaxial strain magnitude between -1

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Discipline: Physics