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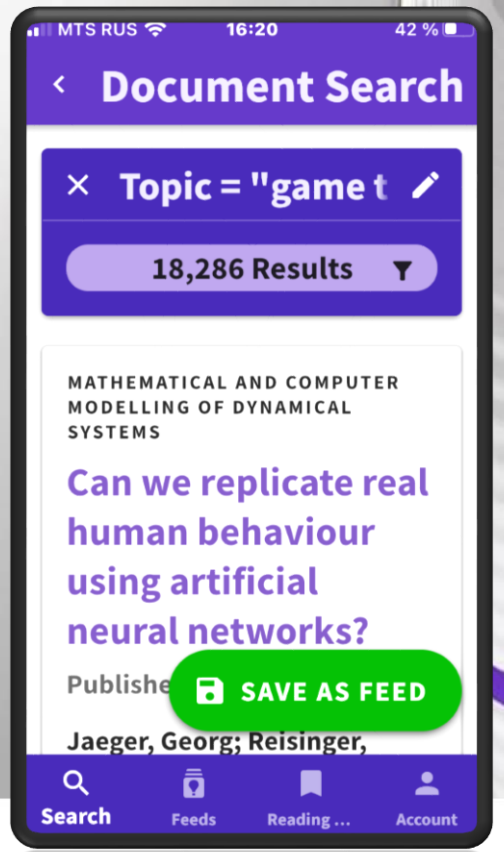

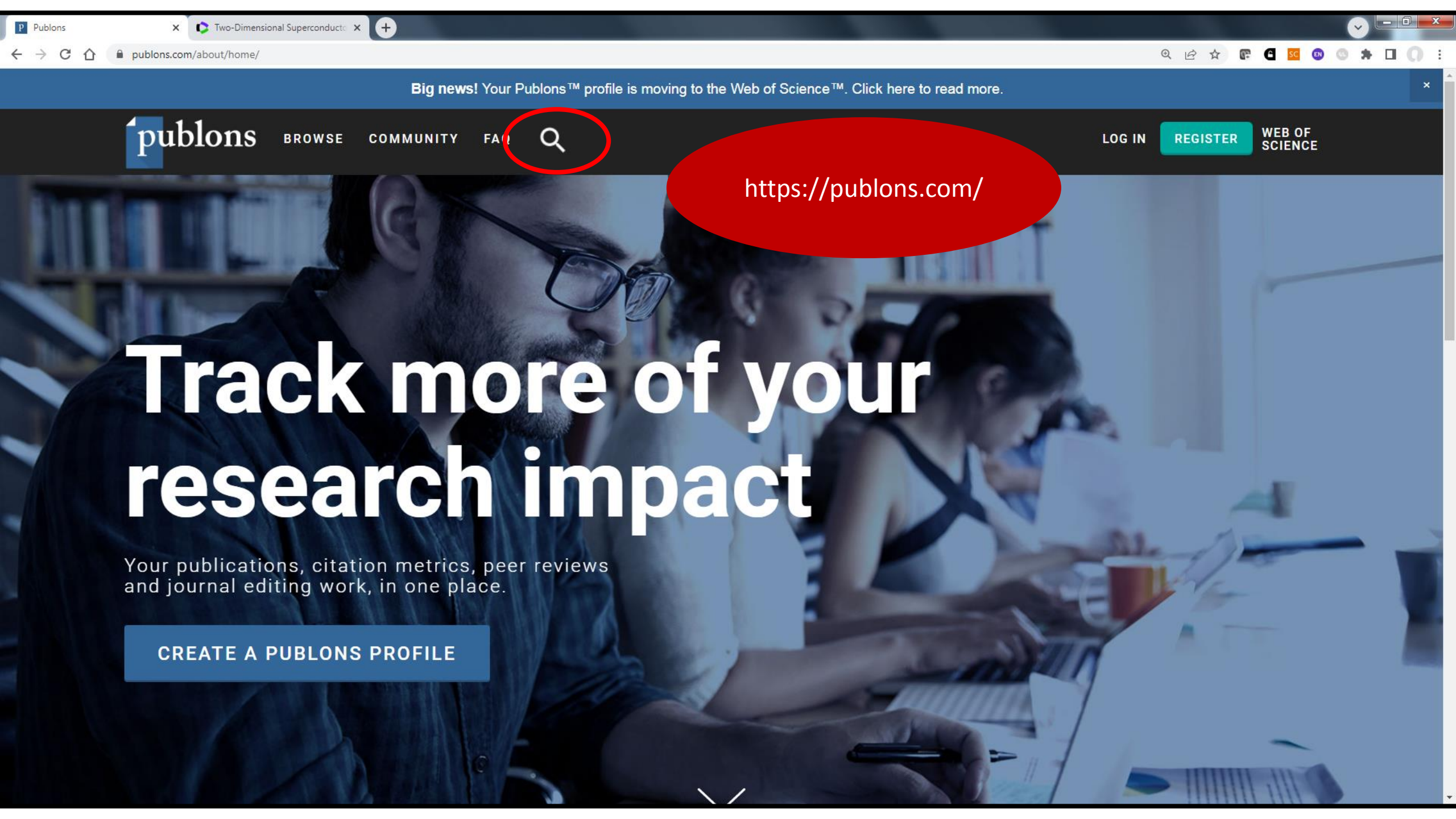
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Two-Dimensional Superconductor with a Giant Rashba Effect: One-Atom-Layer Tl-Pb Compound on Si(111) WEB OF SCIENCE Published: Oct 2015 in Physical Review Letters DOI: 10.1103/PHYSREVLETT.115.147003	79
A Strategy to Create Spin-Split Metallic Bands on Silicon Using a Dense Alloy Layer WEB OF SCIENCE Published: Apr 2014 in Scientific Reports DOI: 10.1038/SREP04742	54
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1 **Growth-Related Formation Mechanism of I3-Type Basal Stacking Fault in Epitaxially Grown Hexagonal Ge-2H**

Vincent, L; Fadaly, EMT; (...); Verheijen, MA
May 2022 (Early Access) | ADVANCED MATERIALS INTERFACES

The hexagonal-2H crystal phase of Ge has recently emerged as a promising direct bandgap semiconductor in the mid-infrared range providing new prospects of additional opto-electronic functionalities of group-IV semiconductors (Ge and SiGe). The controlled synthesis of such hexagonal-2H Ge phase is a challenge that can be overcome by using wurtzite GaAs nanowires as a template. However, depending

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2 **Projection vs. relaxation of adjacent bulk deformation for surface modeling: Theoretical and numerical aspects**

Sievers, C; Mosler, J and Kurzeja, P
Sep 2021 | Jun 2021 (Early Access) | INTERNATIONAL JOURNAL OF SOLIDS AND STRUCTURES 226

Motivated by a strong coupling between bulk and surface physics, we present two approaches to derive continuum surface models from the three-dimensional, adjacent bulk deformation: projection and relaxation. In contrast to conventional ad hoc models, properties like the surface stress are consistently derived from a hyperelastic thermodynamic potential. While the projection approach captures cl

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Growth-Related Formation Mechanism of I3-Type Basal Stacking Fault in Epitaxially Grown Hexagonal Ge-2H

By: Vincent, Laetitia (Vincent, Laetitia) ; Fadaly, Elham M. T. (Fadaly, Elham M. T.) ; Renard, Charles (Renard, Charles) ; Peeters, Wouter H. J. (Peeters, Wouter H. J.) ; Vettori, Marco (Vettori, Marco) ; Panciera, Federico (Panciera, Federico) ; Bouchier, Daniel (Bouchier, Daniel) ; Bakkers, Erik P. A. M. (Bakkers, Erik P. A. M.) ; Verheijen, Marcel A. (Verheijen, Marcel A.)

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DOI: 10.1002/admi.202102340
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Abstract

The hexagonal-2H crystal phase of Ge has recently emerged as a promising direct bandgap semiconductor in the mid-infrared range providing new prospects of additional opto-electronic functionalities of group-IV semiconductors (Ge and SiGe). The controlled synthesis of such hexagonal-2H Ge phase is a challenge that can be overcome by using wurtzite GaAs nanowires as a template. However, depending on growth conditions, unusual basal stacking faults (BSFs) of I-3-type are formed in the metastable 2H structure. The growth of such core/shell heterostructures is observed in situ and in real time by means of environmental transmission electron microscopy using chemical vapor deposition. The observations provide the first direct evidence of a step-flow growth of Ge-2H epilayers and reveal the growth-related formation of I-3-BSFs during unstable growth. Their formation conditions are dynamically investigated. Through these in situ observations, a scenario can be proposed for the nucleation of I-3-type BSFs that is likely valid for any metastable hexagonal 2H or wurtzite structures grown on m-plane substrates. Conditions are identified to avoid their formation for perfect crystalline synthesis of SiGe-2H.

Keywords

Author Keywords: epitaxy; kinetics growth; polytypism; stacking faults; step-flow
Keywords Plus: GROUP IV SEMICONDUCTORS; GAS-SOURCE GROWTH; THIN-FILM GROWTH; STRUCTURAL-PROPERTIES; SURFACE-MORPHOLOGY; SILICON; HYDROGEN; SI; STEPS; COVERAGE

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Two-Dimensional Superconductor with a Giant Rashba Effect: One-Atom-Layer Tl-Pb Compound on Si(111)

By: Matetskiy, A. V. (Matetskiy, A. V.) ; Ichinokura, S. (Ichinokura, S.) ; Bondarenko, L. V. (Bondarenko, L. V.) ; Tupchaya, A. Y. (Tupchaya, A. Y.) ; Gruznev, D. V. (Gruznev, D. V.) ; Zotov, A. V. (Zotov, A. V.) ; Saranin, A. A. (Saranin, A. A.) ; Hobara, R. (Hobara, R.) ; Takayama, A. (Takayama, A.) ; Hasegawa, S. (Hasegawa, S.)

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PHYSICAL REVIEW LETTERS
Volume: 115 **Issue:** 14
Article Number: 147003
DOI: 10.1103/PhysRevLett.115.147003
Published: OCT 2 2015
Indexed: 2015-10-22
Document Type: Article

Abstract
A one-atom-layer compound made of one monolayer of Tl and one-third monolayer of Pb on a Si(111) surface having root 3 x root 3 periodicity was found to exhibit a giant Rashba-type spin splitting of metallic surface-state bands together with two-dimensional superconducting transport properties. Temperature-dependent angle-resolved photoelectron spectroscopy revealed an enhanced electron-phonon coupling for one of the spin-split bands. In situ micro-four-point-probe conductivity measurements with and without magnetic field demonstrated that the (Tl, Pb)/Si(111) system transformed into the superconducting state at 2.25 K, followed by the Berezinskii-Kosterlitz-Thouless mechanism. The 2D Tl-Pb compound on Si(111) is believed to be the prototypical object for prospective studies of intriguing properties of the superconducting 2D system with lifted spin degeneracy, bearing in mind that its composition, atomic and electron band structures, and spin texture are already well established.

Keywords

Keywords Plus: PHASE-TRANSITION; SILICON; FILMS; SYSTEMS; SURFACE

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Categories/Classification

Research Areas: Physics

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