

Letter to the Editor Concerning “The Ground State of Epitaxial Germanene on Ag(111)”

Pantelis Bampoulis and Harold J. W. Zandvliet*

ACS Nano 2023, 17 (16), 15687–15695. DOI: 10.1021/acsnano.3c02821



Cite This: ACS Nano 2023, 17, 22147–22148



Read Online

ACCESS |

Metrics & More

Article Recommendations

In a recent article by Zhang et al.¹ in ACS Nano, the authors write in the abstract of their article that there are many claims of the realization of germanene (the germanium analogue of graphene) but that no experimental evidence for the honeycomb structure of this two-dimensional material has been provided. This statement is incorrect. Already in 2014 we showed that germanene grown on Ge₂Pt has a honeycomb structure.² In Figure 1 a scanning tunneling

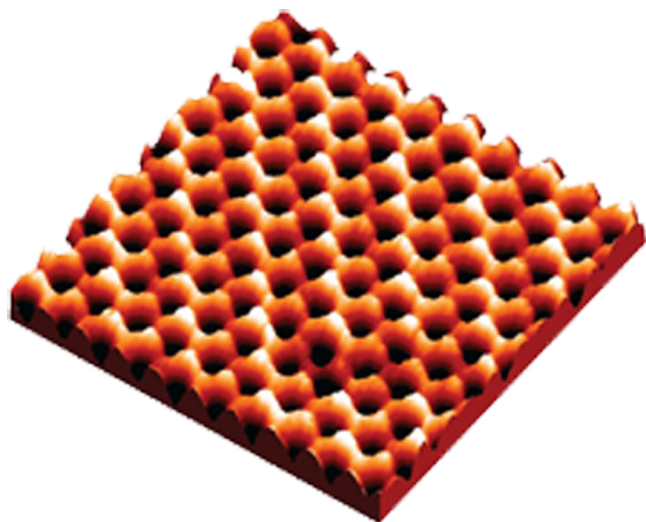


Figure 1. Scanning tunneling microscopy image (4.5 nm by 4.5 nm) of germanene on Ge₂Pt. The buckled honeycomb lattice of germanene is well-resolved. Sample bias -0.5 V, tunnel current 0.2 nA. The image has been taken from ref 2 with the permission of IOP.

image of germanene taken from the aforementioned reference is shown. We would like to emphasize that the observed buckling of germanene's honeycomb lattice^{2,3} is in agreement with theoretical predictions.^{4,5} Finally, Zhang et al.¹ also state in the introduction section of their article that the findings in many germanene manuscripts, including ours,² are questioned. This statement is also incorrect, as our work has not been questioned.

AUTHOR INFORMATION

Corresponding Author

Harold J. W. Zandvliet – *Physics of Interfaces and Nanomaterials, MESA⁺ Institute for Nanotechnology, University of Twente, 7500AE Enschede, The Netherlands;*
 orcid.org/0000-0001-6809-139X;
 Email: h.j.w.zandvliet@utwente.nl

Author

Pantelis Bampoulis – *Physics of Interfaces and Nanomaterials, MESA⁺ Institute for Nanotechnology, University of Twente, 7500AE Enschede, The Netherlands;*
 orcid.org/0000-0002-2347-5223

Complete contact information is available at:
<https://pubs.acs.org/10.1021/acsnano.3c08116>

ACKNOWLEDGMENTS

P.B. and H.J.W.Z. acknowledge the NWO for financial support (VENI and grant number OCENW.M20.232).

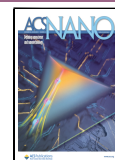
REFERENCES

- (1) Zhang, K.; Hanf, M.-C.; Bernard, R.; Borensztein, Y.; Cruguel, H.; Resta, A.; Garreau, Y.; Vlad, A.; Coati, A.; Sciacca, D.; Grandidier, B.; Derivaz, M.; Pirri, C.; Sonnet, P.; Stephan, R.; Prévot, G. The Ground State of Epitaxial Germanene on Ag(111). ACS Nano 2023, 17, 15687.
- (2) Bampoulis, P.; Zhang, L.; Safaei, A.; van Gastel, R.; Poelsema, B.; Zandvliet, H. J. W. Germanene termination of Ge₂Pt crystals on Ge(110). J. Phys. Cond. Mater. 2014, 26, 442001.
- (3) Bampoulis, P.; Castenmiller, C.; Klaassen, D. J.; van Mil, J.; Liu, Y.; Liu, C.-C.; Yao, Y.; Ezawa, M.; Rudenko, A. N.; Zandvliet, H. J. W. Quantum Spin Hall States and Topological Phase Transition in Germanene. Phys. Rev. Lett. 2023, 130, 196401.

Received: August 28, 2023

Accepted: November 2, 2023

Published: November 28, 2023



- (4) Takeda, K.; Shirashi, K. Theoretical possibility of stage corrugation in Si and Ge analogs of graphite. *Phys. Rev. B* **1994**, *50*, 14916.
- (5) Cahangirov, S.; Topsakal, M.; Aktürk, E.; Şahin, H.; Ciraci, S. Two- and One-Dimensional Honeycomb Structures of Silicon and Germanium. *Phys. Rev. Lett.* **2009**, *102*, 236804.