

Stanford



Rafael Vila

Ph.D. Student in Materials Science and Engineering, admitted Autumn 2017

Bio

HONORS AND AWARDS

- NSF Graduate Research Fellowship, National Science Foundation (May 2017)
- Ford Foundation Fellowship, National Academy of Sciences, Ford Foundation (May 2017)
- EDGE Fellowship, Stanford University (May 2017)

EDUCATION AND CERTIFICATIONS

- B.S., Pennsylvania State University , Materials Science and Engineering (2016)
- A.S., Cochise College , Engineering (2013)

PATENTS

- Rafael A. Vilá. "United States Patent 62/398,751 Vertical 2D Structures for Advanced Electronic and Optoelectronic Systems", Pennsylvania State University, Oct 14, 2015

Teaching

COURSES

2021-22

- Transmission Electron Microscopy Laboratory: MATSCI 322 (Aut)

Publications

PUBLICATIONS

- **LiH formation and its impact on Li batteries revealed by cryogenic electron microscopy.** *Science advances*
Vilá, R. A., Boyle, D. T., Dai, A., Zhang, W., Sayavong, P., Ye, Y., Yang, Y., Dionne, J. A., Cui, Y.
2023; 9 (12): eadf3609
- **Ni Anchored to Hydrogen-Substituted Graphdiyne for Lithium Sulfide Cathodes in Lithium-Sulfur Batteries.** *Nano letters*
Greenburg, L. C., Gao, X., Zhang, P., Zheng, X., Wang, J., Vila, R. A., Cui, Y.
2023
- **In Situ Prelithiation by Direct Integration of Lithium Mesh into Battery Cells.** *Nano letters*
Yang, Y., Wang, J., Kim, S. C., Zhang, W., Peng, Y., Zhang, P., Vila, R. A., Ma, Y., Jeong, Y. K., Cui, Y.
2023
- **Dissolution of the Solid Electrolyte Interphase and Its Effects on Lithium Metal Anode Cyclability.** *Journal of the American Chemical Society*
Sayavong, P., Zhang, W., Oyakhire, S. T., Boyle, D. T., Chen, Y., Kim, S. C., Vilá, R. A., Holmes, S. E., Kim, M. S., Bent, S. F., Bao, Z., Cui, Y.
2023

- **Hydrogen-substituted graphdiyne-assisted ultrafast sparking synthesis of metastable nanomaterials.** *Nature nanotechnology*
Zheng, X., Gao, X., Vila, R. A., Jiang, Y., Wang, J., Xu, R., Zhang, R., Xiao, X., Zhang, P., Greenburg, L. C., Yang, Y., Xin, H. L., Zheng, et al
2022
- **Onboard early detection and mitigation of lithium plating in fast-charging batteries.** *Nature communications*
Huang, W., Ye, Y., Chen, H., Vilá, R. A., Xiang, A., Wang, H., Liu, F., Yu, Z., Xu, J., Zhang, Z., Xu, R., Wu, Y., Chou, et al
2022; 13 (1): 7091
- **Correlating Kinetics to Cyclability Reveals Thermodynamic Origin of Lithium Anode Morphology in Liquid Electrolytes.** *Journal of the American Chemical Society*
Boyle, D. T., Kim, S. C., Oyakhire, S. T., Vila, R. A., Huang, Z., Sayavong, P., Qin, J., Bao, Z., Cui, Y.
2022
- **Resolving Current-Dependent Regimes of Electroplating Mechanisms for Fast Charging Lithium Metal Anodes.** *Nano letters*
Boyle, D. T., Li, Y., Pei, A., Vila, R. A., Zhang, Z., Sayavong, P., Kim, M. S., Huang, W., Wang, H., Liu, Y., Xu, R., Sinclair, R., Qin, et al
2022
- **Bright and stable light-emitting diodes made with perovskite nanocrystals stabilized in metal-organic frameworks** *NATURE PHOTONICS*
Tsai, H., Shrestha, S., Vila, R. A., Huang, W., Liu, C., Hou, C., Huang, H., Wen, X., Li, M., Wiederrecht, G., Cui, Y., Cotlet, M., Zhang, et al
2021
- **Cryogenic Electron Microscopy for Energy Materials.** *Accounts of chemical research*
Zhang, Z., Cui, Y., Vila, R., Li, Y., Zhang, W., Zhou, W., Chiu, W., Cui, Y.
2021
- **Potentiometric Measurement to Probe Solvation Energy and Its Correlation to Lithium Battery Cyclability.** *Journal of the American Chemical Society*
Kim, S. C., Kong, X., Vila, R. A., Huang, W., Chen, Y., Boyle, D. T., Yu, Z., Wang, H., Bao, Z., Qin, J., Cui, Y.
2021
- **Microclusters of Kinked Silicon Nanowires Synthesized by a Recyclable Iodide Process for High-Performance Lithium-Ion Battery Anodes** *ADVANCED ENERGY MATERIALS*
Jeong, Y., Huang, W., Vila, R. A., Huang, W., Wang, J., Kim, S., Kim, Y., Zhao, J., Cui, Y.
2020
- **Nickel Impurities in the Solid-Electrolyte Interphase of Lithium-Metal Anodes Revealed by Cryogenic Electron Microscopy** *CELL REPORTS PHYSICAL SCIENCE*
Vila, R. A., Huang, W., Cui, Y.
2020; 1 (9)
- **Incorporating the nanoscale encapsulation concept from liquid electrolytes into solid-state lithium-sulfur batteries.** *Nano letters*
Gao, X., Zheng, X., Wang, J., Zhang, Z., Xiao, X., Wan, J., Ye, Y., Chou, L., Lee, H. K., Wang, J., Vila, R. A., Yang, Y., Zhang, et al
2020
- **Tortuosity Effects in Lithium-Metal Host Anodes** *JOULE*
Chen, H., Pei, A., Wan, J., Lin, D., Vila, R., Wang, H., Mackanic, D., Steinruck, H., Huang, W., Li, Y., Yang, A., Xie, J., Wu, et al
2020; 4 (4): 938–52
- **Electrochemical generation of liquid and solid sulfur on two-dimensional layered materials with distinct areal capacities.** *Nature nanotechnology*
Yang, A. n., Zhou, G. n., Kong, X. n., Vilá, R. A., Pei, A. n., Wu, Y. n., Yu, X. n., Zheng, X. n., Wu, C. L., Liu, B. n., Chen, H. n., Xu, Y. n., Chen, et al
2020
- **Electrochemical generation of liquid and solid sulfur on two-dimensional layered materials with distinct areal capacities** *Nature Nanotechnology*
Yang, A., Zhou, G., et al
2020
- **Unravelling Degradation Mechanisms and Atomic Structure of Organic-Inorganic Halide Perovskites by Cryo-EM** *JOULE*
Li, Y., Zhou, W., Li, Y., Huang, W., Zhang, Z., Chen, G., Wang, H., Wu, G., Rolston, N., Vila, R., Chiu, W., Cui, Y.
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- **Unravelling Atomic Structure and Degradation Mechanisms of Organic-Inorganic Halide Perovskites by Cryo-EM.** *Joule*

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- Li, Y., Zhou, W., Li, Y., Huang, W., Zhang, Z., Chen, G., Wang, H., Wu, G. H., Rolston, N., Vila, R., Chiu, W., Cui, Y.
2019; 3 (11): 2854-2866
- **Cryo-EM Structures of Atomic Surfaces and Host-Guest Chemistry in Metal-Organic Frameworks** *MATTER*
Li, Y., Wang, K., Zhou, W., Li, Y., Vila, R., Huang, W., Wang, H., Chen, G., Wu, G., Tsao, Y., Wang, H., Sinclair, R., Chiu, et al
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 - **Cryo-EM structures of atomic surfaces and host-guest chemistry in metal-organic frameworks.** *Matter*
Li, Y., Wang, K., Zhou, W., Li, Y., Vila, R., Huang, W., Wang, H., Chen, G., Wu, G. H., Tsao, Y., Wang, H., Sinclair, R., Chiu, et al
2019; 1 (2): 428-438
 - **Wrinkled Graphene Cages as Hosts for High-Capacity Li Metal Anodes Shown by Cryogenic Electron Microscopy.** *Nano letters*
Wang, H., Li, Y., Li, Y., Liu, Y., Lin, D., Zhu, C., Chen, G., Yang, A., Yan, K., Chen, H., Zhu, Y., Li, J., Xie, et al
2019
 - **In situ crystallization kinetics of two-dimensional MoS₂** *2D Materials*
Vilá, R. A., Rao, R., Muratore, C., Bianco, E., Robinson, J. A., Maruyama, B., Glavin, N. R.
2017; 5 (1)
 - **Bottom-up synthesis of vertically oriented two-dimensional materials** *2D MATERIALS*
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 - **Two-dimensional gallium nitride realized via graphene encapsulation** *NATURE MATERIALS*
Al Balushi, Z. Y., Wang, K., Ghosh, R. K., Vila, R. A., Eichfeld, S. M., Caldwell, J. D., Qin, X., Lin, Y., DeSario, P. A., Stone, G., Subramanian, S., Paul, D. F., Wallace, et al
2016; 15 (11): 1166-?
 - **Growth and Tunable Surface Wettability of Vertical MoS₂ Layers for Improved Hydrogen Evolution Reactions** *ACS APPLIED MATERIALS & INTERFACES*
Bhimanapati, G. R., Hankins, T., Lei, Y., Vila, R. A., Fuller, I., Terrones, M., Robinson, J. A.
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