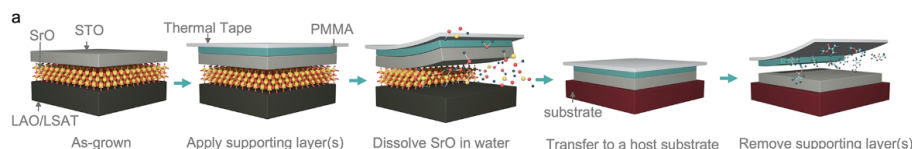




Free-standing perovskite oxide membranes

A novel method for the synthesis and deposition of perovskite oxide membranes onto a substrate.



IP Status: Provisional Patent Application Filed

Applications

- Wearable technology
- Flexible electronics

Key Benefits & Differentiators

- **Simple growth and optimization:** Utilizes a simple binary oxide as the sacrificial layer
- **High thermal stability:** The thermal stability of the sacrificial layer minimizes cation intermixing at high growth temperatures
- **Aluminum free:** The aluminum-free sacrificial layer is not prone to oxidation

Technology Overview

Thin film deposition is an important manufacturing step in the production of semiconductors, consumer electronics, medical devices, and wearables. Traditionally, the functional materials used in these devices are grown on commercially available substrates using various thin-film deposition techniques. However, the use of these rigid substrates severely limits the flexibility of the thin films. Previous work has demonstrated that by using a sacrificial layer during synthesis, the thin film can be separated from the substrate and deposited on structurally and chemically incompatible surfaces. Nevertheless, existing sacrificial layers are complex in structure and require a difficult growth process, reducing their practicality and utility.

Researchers at the University of Minnesota have developed a novel method to synthesize and deposit perovskite oxide membranes onto a substrate of interest by using a sacrificial layer that dissolves upon contact with water. After removing the sacrificial layer, the free-standing perovskite oxide thin film can be transferred to the desired host substrate. This technique utilizes a simple binary oxide sacrificial layer and requires no extra tools or materials beyond what is typically used for this type of thin film growth. The high thermal stability of the binary oxide sacrificial layer prevents cation intermixing at high growth temperatures. Lastly, this sacrificial layer does not contain aluminum which can be problematic due to its ease of oxidation.

Phase of Development

Technology ID

2023-206

Category

Engineering & Physical Sciences/Chemicals
Engineering & Physical Sciences/Materials
Engineering & Physical Sciences/Nanotechnology
Engineering & Physical Sciences/Semiconductor

Learn more



TRL: 3-4

Proof of concept. 30+ membranes have been synthesized and transferred to various substrates.

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Please contact our office to share your business' needs and learn more.

Researchers

- [Bharat Jalan, PhD](#) Professor, Department of Chemical Engineering and Materials Science

References

1. Shivasheesh Varshney, Sooho Choo, Liam Thompson, Zhifei Yang, Jay Shah, Jiaxuan Wen, Steven J. Koester, K. Andre Mkhoyan, Alexander S. McLeod, and Bharat Jalan(2024) ,
<https://doi.org/10.1021/acsnano.3c11192>,
<https://pubs.acs.org/doi/full/10.1021/acsnano.3c11192>, 8, 6348-6358