Controlled Homo-Epitaxial Growth Of Hybrid Halide Crystals

Tech ID: 29459 / UC Case 2018-014-0

BACKGROUND

Organic-inorganic hybrid perovskites have demonstrated tremendous potential for next-generation electronic and optoelectronic devices due to their remarkable carrier dynamics. However, current studies of electronic and optoelectronic devices have been focused on polycrystalline materials, due to the challenges in synthesizing device compatible high quality single crystalline materials.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have accomplished epitaxial growth of single crystal hybrid perovskites with controlled locations, morphologies, and orientations. The invention uses combined strategies of lithography, homoepitaxy, and low temperature solution methods. The crystals grow following a layer-by-layer model under controlled growth parameters. The process is robust and can be readily scaled up. The as-grown epitaxial single crystals were integrated in an array of light emitting diodes, each crystal as a pixel with enhanced quantum efficiencies. This capability opens up new opportunities for designing and fabricating a diverse range of high performance electronic and optoelectronic devices using crystalline hybrid perovskites.

APPLICATIONS

Potential uses include, solar cell, light emitting diode, optical sensor

ADVANTAGES

This invention represents the first patterned epitaxial growth of perovskite single crystals—a critical advancement in device integration of organic–inorganic hybrid perovskite materials.

STATE OF DEVELOPMENT

A prototype has been developed.

INTELLECTUAL PROPERTY INFO

This technology is patent pending and available for licensing and/or research sponsorship.

RELATED MATERIALS

- Yusheng Lei, Yimu Chen, Yue Gu, Chunfeng Wang, Zhenlong Huang, Haoliang Qian, Jiuyuan Nie, Geoff Hollett, Woojin Choi, Yugang Yu, NamHeon Kim, Chonghe Wang, Tianjiao Zhang, Hongjie Hu, Yunxi Zhang, Xiaoshi Li, Yang Li, Wanjun Shi, Zhaowei Liu, Michael J. Sailor, Lin Dong, Yu-Hwa Lo, Jian Luo, and Sheng XuControlled Homoepitaxial Growth of Hybrid Perovskites. 2018 Advanced Materials Communication, April 2, 2018 DOI: 10.1002/adma.201705992 - 04/02/2018

PATENT STATUS

Patent Pending

CONTACT

University of California, San Diego
Office of Innovation and Commercialization
innovation@ucsd.edu
tel: 858.534.5815.

OTHER INFORMATION

KEYWORDS

Hybrid perovskites, hybrid halides, epitaxial growth, optoelectronics, organic-inorganic

CATEGORIZED AS

- **Materials & Chemicals**
  - Thin Films
- **Nanotechnology**
  - Electronics
- **Semiconductors**
  - Processing and Production

RELATED CASES

2018-014-0

University of California, San Diego
Office of Innovation and Commercialization
9500 Gilman Drive, MC 0910, ,
La Jolla,CA 92093-0910

Tel: 858.534.5815
innovation@ucsd.edu
https://innovation.ucsd.edu
Fax: 858.534.7345