

Accepted Manuscript

Fabrication and Optical Properties of lift-off InP Membranes

Zhiguang Xiao, Dezhong Cao, Songlin Sha, Xiaokun Yang, Chongchong Zhao

PII: S0167-577X(17)31902-X
DOI: <https://doi.org/10.1016/j.matlet.2017.12.135>
Reference: MLBLUE 23633

To appear in: *Materials Letters*

Received Date: 15 November 2017
Revised Date: 23 December 2017
Accepted Date: 27 December 2017

Please cite this article as: Z. Xiao, D. Cao, S. Sha, X. Yang, C. Zhao, Fabrication and Optical Properties of lift-off InP Membranes, *Materials Letters* (2017), doi: <https://doi.org/10.1016/j.matlet.2017.12.135>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Fabrication and Optical Properties of lift-off InP Membranes

Zhiguang Xiao¹, Dezhong Cao^{2,*}, Songlin Sha², Xiaokun Yang³, Chongchong Zhao³

¹ Shandong Experimental High School, Jinan, 250109, P. R. China.

² School of Physics, Shandong University, Jinan, 250100, P. R. China.

³ School of Microelectronics, Shandong University, Jinan, 250100, P. R. China.

Abstract: An electrochemical etching based on HCl solution was developed for use in the chemical lift-off of InP membranes. Under the same etching conditions, the diameter of InP pores increases with the increase of etching depth or etching voltage. When the etching depth or etching voltage is over a critical value, the InP layer can be electropolished, leading to the lift-off of nanoporous InP membranes. The lift-off membranes can be transferred onto a substrate. Compared to the planar InP wafer, the etched InP wafer and transferred InP membrane present stronger photoluminescence emission and weaker reflectance in the range of 250-850 nm.

Key Words: InP wafer, Porous materials, Electrochemical etching, Lift-off, Luminescence

1. Introduction

Indium phosphide (InP) with a direct band gap of 1.34 eV has attracted attention over the years as effective materials for high-speed electronics and optoelectronic devices. Since the discovery of intense luminescence from porous silicon [1], porous InP has been extensively investigated [2-6]. Porous InP with a high surface and a low reflectance [2] in the visible light range can improve the performance ability of photosensitive devices such as photodetectors, high-efficiency solar cells, and photoelectrochemical (PEC) splitting of water. However, high-cost of InP wafers limits the development of electronics and optoelectronic devices.

* Corresponding author. *E-mail address:* dzcao666@qq.com (D. Cao).

Download English Version:

<https://daneshyari.com/en/article/8014295>

Download Persian Version:

<https://daneshyari.com/article/8014295>

[Daneshyari.com](https://daneshyari.com)