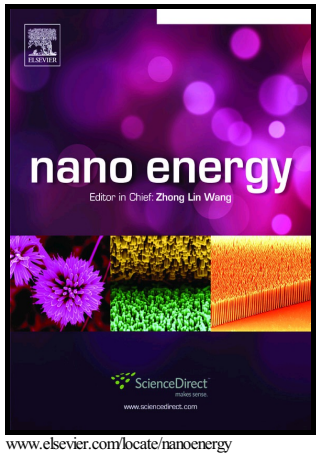
Author's Accepted Manuscript



www.elsevier.com/locate/nanoenergy

AlN Piezoelectric Thin Films for Energy Harvesting and Acoustic Devices

Chunlong Fei, Xiangli Liu, Benpeng Zhu, Di Li, Xiaofei Yang, Yintang Yang, Qifa Zhou

PII: S2211-2855(18)30457-9
DOI: https://doi.org/10.1016/j.nanoen.2018.06.062
Reference: NANOEN2843

To appear in: *Nano Energy*

Received date: 13 April 2018
Revised date: 16 June 2018
Accepted date: 17 June 2018

Cite this article as: Chunlong Fei, Xiangli Liu, Benpeng Zhu, Di Li, Xiaofei Yang, Yintang Yang and Qifa Zhou, AlN Piezoelectric Thin Films for Energy Harvesting and Acoustic Devices, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.06.062

AlN Piezoelectric Thin Films for Energy Harvesting and Acoustic Devices

Chunlong Fei[a1], Xiangli Liu[b1], Benpeng Zhu[b,e,*], Di Li[a], Xiaofei Yang[b], Yintang Yang[a], Qifa Zhou[c,d,*]

[a]School of Microelectronics, Xidian University, Xi'an 710071, China

[b]School of Optical and Electronic Information—Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan 430074, China

[c]Roski Eye Institution, University of Southern California, Los Angeles, California 90089-1111, USA

[d]Department of Biomedical Engineering and NIH Transducer Resource Center, University of Southern California, Los Angeles, California 90089-1111, USA

[e]Engineering Research Center for Functional Ceramics, Ministry of Education, Huazhong University of Science and Technology, Wuhan, 430074, China

Dr. Benpeng Zhu, benpengzhu@hust.edu.cn
Dr. Qifa Zhou, qifazhou@usc.edu
*Corresponding author.

Abstract:

Aluminum nitride (AlN) thin films are widely investigated due to their unique physical properties and applications in energy harvesting devices, ultrasonic transducers, microelectronics, high-frequency wide band communications, and power semiconductor devices. This article reviews recent studies of AlN structures, focusing on their fabrication and novel applications. Various fabrication techniques used to synthesize AlN films are discussed, along with their growth mechanisms and crystal structure. The physical properties of AlN films are summarized, including their mechanical and electrical properties (in particular the piezoelectric behavior). Finally, the application of AlN thin films in the fields of energy harvesting and acoustic devices is discussed in detail. Furthermore, this review proposes perspectives for future development of AlN thin films.

[1] (Chunlong Fei and Xiangli Liu contribute equally to this paper)