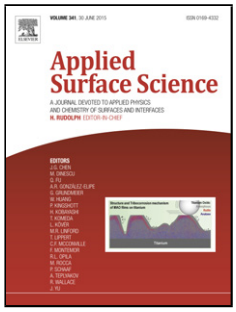

Title: Optical and XPS studies of BCN thin films by co-sputtering of B_4C and BN targets

Author: Adithya Prakash Kalpathy B. Sundaram

PII: S0169-4332(16)32317-0
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.10.180
Reference: APSUSC 34274

To appear in: *APSUSC*

Received date: 22-6-2016
Revised date: 23-9-2016
Accepted date: 27-10-2016

Please cite this article as: Adithya Prakash, Kalpathy B.Sundaram, Optical and XPS studies of BCN thin films by co-sputtering of B4C and BN targets, Applied Surface Science http://dx.doi.org/10.1016/j.apsusc.2016.10.180

Optical and XPS studies of BCN thin films by co-sputtering of B_4C and BN targets

Adithya Prakash* and Kalpathy B. Sundaram

Department of Electrical Engineering and Computer Science, University of Central Florida, Orlando, FL 32816 USA

*Corresponding Author

Email: adithya@knights.ucf.edu

Phone: +1 407-601-9867

Highlights

- A wide range of optical band gaps (E_g) are achieved for dual target sputtered deposited BCN thin films in the range of 1.9 eV to 3.7 eV.
- Optical band gap (Eg) studies are performed as a function of target powers, gas ratios and deposition temperatures.
- Eg is found to increase with N_2/Ar flow ratios and deposition temperatures.
- XPS studies are conducted to ascertain the chemical and bonding characteristics.
- XPS confirmed higher h-BN and B_4C characteristics with increase in N_2/Ar gas ratios for films deposited at 20W and 40W B_4C power respectively.

ABSTRACT

Boron carbon nitride (BCN) thin films are investigated for their optical properties. BCN, is the unanimous choice for inter-dielectric layer (IDL) in very large scale integration (VLSI) because of its low-k dielectric constant. Optical properties can be tailored as a function of elemental composition, which makes BCN a prospective material in UV-filters and mirrors. Films are deposited by reactive co-sputtering of boroncarbide (B_4C) and boronnitride (BN) with varying N_2/Ar gas flow ratio by DC and RF sputtering respectively. XPS studies are performed to deduce the bonding and chemical properties of the BCN film. Optical band gap (Eg) studies are