

## Accepted Manuscript

Electrical and reliability characteristics of dielectric stack with low dielectric constant SiCOH and capping SiCNH films



Yi-Lung Cheng, Chih-Yen Lee, Wei-Jie Hung, Giin-Shan Chen, Jau-Shiung Fang

PII: S0257-8972(18)30649-2  
DOI: doi:[10.1016/j.surfcoat.2018.06.071](https://doi.org/10.1016/j.surfcoat.2018.06.071)  
Reference: SCT 23525  
To appear in: *Surface & Coatings Technology*  
Received date: 25 March 2018  
Revised date: 2 June 2018  
Accepted date: 4 June 2018

Please cite this article as: Yi-Lung Cheng, Chih-Yen Lee, Wei-Jie Hung, Giin-Shan Chen, Jau-Shiung Fang , Electrical and reliability characteristics of dielectric stack with low dielectric constant SiCOH and capping SiCNH films. Sct (2018), doi:[10.1016/j.surfcoat.2018.06.071](https://doi.org/10.1016/j.surfcoat.2018.06.071)

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.

# Electrical and Reliability Characteristics of Dielectric Stack with Low Dielectric Constant SiCOH and Capping SiCNH Films

Yi-Lung Cheng<sup>a\*</sup>, Chih-Yen Lee<sup>a</sup>, Wei-Jie Hung<sup>a</sup>, Giin-Shan Chen<sup>b</sup>, and Jau-Shiung Fang<sup>c</sup>

<sup>a</sup>Department of Electrical Engineering, National Chi-Nan University, Nan-Tou, 54561, Taiwan, R.O.C.

<sup>b</sup>Department of Materials Science and Engineering, Feng Chia University, Taichung, 40724, Taiwan, R.O.C.

<sup>c</sup>Department of Materials Science and Engineering, National Formosa University, Huwei, 63201, Taiwan, R.O.C.

## Abstract

This work investigates the electrical characteristics and reliability of a dielectric stack with a low-dielectric-constant (low- $k$ ) SiOCH film and a capping SiCNH film. Two kinds of low- $k$  SiOCH films were used: a dense low- $k$  film without porosity and a porous low- $k$  film with a porosity of 15.0. The deposition of the capping SiCNH layer on both dense and porous low- $k$  SiOCH films increased the overall dielectric constant. The porous low- $k$  SiOCH film exhibited a greater increase in the dielectric constant. Capping a SiCNH layer on a low- $k$  SiOCH film can retard damage by O<sub>2</sub> plasma and diffusion of Cu ions. Larger improvements in time-dependent-dielectric-breakdown and electromigration lifetimes were detected for the porous low- $k$  SiOCH film.

**Keywords:** Low-dielectric-constant, Porous dielectric, Leakage current, Cu migration, Reliability, Time-dependent-dielectric-breakdown, Electromigration.

Download English Version:

<https://daneshyari.com/en/article/8023249>

Download Persian Version:

<https://daneshyari.com/article/8023249>

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