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Name of Candidate:	**NUR FATIN FARHANAH BINTI NAZARUDIN**
I/C/Passport No:	**900222-08-6270**
Regisration/Matric No.:	**SGB120011**
Name of Degree:	**MASTER OF SCIENCE (APPLIED PHYSICS)**

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):

"STUDIES ON GROWTH, STRUCTURAL AND PHOTOLUMINESCENSE PROPERTIES OF NiSi/SiC CORE-SHELL NANOWIRES BY HWCVD"

Field of Study: **NANOTECHNOLOGY AND NANOMATERIALS**

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ABSTRACT

NiSi/SiC core-shell nanorods and nanowires grown on nickel (Ni) coated glass substrates by hot-wire chemical vapour deposition were studied. The Ni was used as a catalyst to induce the growth of these core-shell nanorods and nanowires. These nanorods and nanowires were growth at different deposition pressures in the range between 1 and 3 mbar. Increase in deposition pressure prefers to the growth of the nanowires at 3 mbar. These nanowires consisted of single crystalline NiSi and amorphous SiC attributed to core and shell of the nanowires respectively. Moreover, an increase in deposition pressure induces a phase transition of the nanowires from crystalline Si phase to amorphous SiC phase. The shell of the nanowires showed presence of 3C-SiC nano-crystallites embedded within an amorphous matrix. Presence of these nano-crystallites embedded within the amorphous SiC matrix exhibits broad PL emission spectra in visible region. The effects of the deposition pressure on the growth and structural properties of these core-shell nanowires are discussed.

Keywords: Core-shell nanowires; Nickel silicides; SiC; Metal induced growth; HWCVD

ABSTRAK

NiSi / SiC nanorod teras-kulit dan nanowayar ditanam di atas substrat nikel (Ni) kaca bersalut dengan wayar-panas pemendapan wap kimia telah dikaji. Ni telah digunakan sebagai pemangkin untuk mendorong pertumbuhan nanorod teras-kulit dan nanowayar ini. Pertumbuhan nanorod dan nanowayar telah dilakukan pada tekanan pemendapan yang berbeza dalam julat di antara 1 dan 3 mbar. Peningkatkan tekanan pemendapan menjurus kepada pertumbuhan nanowayar pada 3 mbar. Nanowayar ini terdiri daripada nanowayar NiSi tunggal hablur dan SiC amorfus dikaitkan dengan teras dan kulit daripada nanowayar masing-masing. Selain itu, peningkatan dalam tekanan pemendapan mendorong peralihan fasa nanowayar daripada fasa Si hablur ke fasa SiC amorfus. Kulit daripada nanowayar menunjukkan kehadiran nanohablur 3C-SiC tertanam dalam matriks amorfus. Kehadiran nanohablur tertanam dalam amorfus SiC matriks mempamerkan luas PL spektrum di kawasan yang kelihatan. Kesan tekanan pemendapan terhadap pertumbuhan dan sifat-sifat nanaowayar struktur teras-kulit ini dibincangkan.

Kata kunci: Teras-kulit nanowayar; Nikel silisida; SiC; Pengaruh Logam dalam Pertumbuhan; HWCVD

ACKNOWLEDGEMENT

Firstly, I would like to thank Allah for his guidance in the completion of this work. I would like to express my sincere gratitude and thanks to my supervisor, Dr. Goh Boon Tong for guiding and advising me throughout this work. Profuse thanks to him for being patient and understanding. Without his criticism, comments, timely aid and intervention this may not have materialized.

Also, I would like to thank all Low Dimensional Materials Research Centre, Department of Physics in University of Malaya members for guiding me, gives suggestions and ideas: Azieani Azizan, Mahdi Alizadeh, Dr Ganesh, Anas Kamarundzaman and Adreen Azman. The experiences with them have been wonderful, interesting and rewarding one.

Besides, I would like to share my gratitude with my beloved parents (Mr Nazarudin A Rahman and Mrs Abidah Shaari) and family for their unconditional support, both financially and emotionally throughout my studies. Their patience and understanding is greatly appreciated. Last but not least, special thanks to my best friend Zulaikha Ibrahim for the endless support and encouragement in achieving my goal. Thank you!

This work was supported by the Ministry of Higher Education of Malaysia, for Exploratory Research Grant Scheme (ERGS) of ER003-2013A and University of Malaya Research Grant of (RG259-13AFR).

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