

A NEW CARBON NANOPARTICLE-POLYMER  
COMPOSITE FOR CELL IMPRINT  
LITHOGRAPHY

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Doctor of Philosophy

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## **SUPERVISOR'S DECLARATION**

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Doctor of Philosophy.

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## **STUDENT'S DECLARATION**

I hereby declare that the work in this thesis is based on my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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IMPRINT LITHOGRAPHY

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## DEDICATION

*I dedicate this thesis to my family members, Mom, Dad, Lakshmi, Balaji and Gopal. Also to my friends and teachers.*

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## LIST OF SYMBOLS

$U_i$	Inlet velocity
$U_o$	Outlet velocity
$P_i$	Inlet pressure
$P_o$	Outlet pressure
$\Theta$	Biochip tilt angle
$Re$	Reynolds number

## LIST OF ABBREVIATION

BZ	Bezoar
CGM	Complete growth media
CNP	Carbon nano particle
CPM	Carbon-polymer mixture
CPC	Carbon polymer composite
CI-CPC	Cell imprinted carbon polymer composite
FPALM	Fluorescent photo-activation localisation microscopy
FDA	Fluorescein di acetate
HDPE	High density polyethylene
IPA	Isopropyl alcohol
IL	Imprinting threshold
LADI	Laser assisted direct imprinting
MCC	Multiple cell capture
MDWRE	Mean depth-width ratio of extrema
NIL	Nanoimprint lithography
NC	No capture
N-CPC	Non-carbon polymer composite
PI	Propidium iodide
PALM	Photo-activation localisation microscopy
PBS	Phosphate buffer solution
PET	Polyethylene terephthalate
ROI	Region of interest
SFIL	Step and flash imprint lithography
SSIL	Step and stamp imprint lithography
SCA	Single cell analysis

SCC	Single cell capture
SEM	Scanning electron microscope
TEM	Transmission electron microscope
TCMA	Truncated cone-shaped microcell array
T-NIL	Thermoplastic nanoimprint lithography
UV-NIL	UV-nanoimprint lithography
VC	Vincristine sulphate