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I, Ashwini Kumar Mishra, certify that the work embodied in this thesis is my own bonafide work and carried out by me under the supervision of Prof. S. Jit and Dr. Bratindranath Mukherjee from "21/07/2015" to “30/12/2020”, at the Department of Electronics Engineering, Indian Institute of Technology (BHU), Varanasi. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma. I declare that I have faithfully acknowledged and given credits to the research workers wherever their works have been cited in my work in this thesis. I further declare that I have not will fully copied any other's work, paragraphs, text, data, results, *etc*., reported in journals, books, magazines, reports, dissertations, theses, *etc*., or available at websites and have not included them in this thesis and have not cited as my own work.

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Date: **(Ashwini Kumar Mishra)**

Dedicated
To
My Family and
My Supervisors

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Details
EGFET	Extended Gate Field Effect Transistor
FETs	Field-effect transistors
MOSFET	Metal oxide semiconductor field-effect transistor
TFT	Thin film transistor
HRTEM	High Resolution Transmission Electron Microscopy
STEM	Scanning Transmission Electron Microscopy
HAADF	High Angle Annular dark field
XPS	X-Ray Photo -Electron Spectroscopy
CuO NWs	Copper Oxide Nanowires
GNP	Gold Nano Particle
FAD	Flavin Adenine Dinucleotide
CB	Conduction Band
UA	Uric Acid
AA	Ascorbic Acid
DA	Dopamine
ISFET	Ion Sensing Field Effect Transistor
MWCNT	Multi Wall Carbon Nano Tube
pH	Power of Hydrogen
DI	Deionized
FESEM	Field Effect Scanning Electron Microscopy
CuOOH	Copper Oxyhydroxide
PBS	Phosphate Buffer Saline
HMTA	Hexa-Mythel Tetramine
NPs	Nanoparticles
SEM	Scanning electron microscopy
EDX or EDS	Energy dispersive X-ray spectroscopy
TEM	Transmission electron microscopy

SAED	Selected area electron diffraction
XRD	X-ray diffraction
CV	Cyclic voltammetry
SMU	Source and measuring unit
CNT	Carbon Nanotube
Ar	Argon Gas
ZnO	Zinc Oxide
QDs	Quantum Dots
Au	Gold
Ag	Silver
AgCl	Silver Chloride
FTO	Fluorine-doped tin oxide
DL	Detection limit
H_2	Hydrogen gas
EG	Extended Gate

LIST OF SYMBOLS

Symbol	Details
λ	Wavelength
θ	Half Diffraction angle
GO_X	Glucose Oxidase
n	Order of the diffraction, λ is wavelength of the rays,
d	Inter-Planar spacing of the diffracting planes,
CV	Cyclic Voltammeter
It	Current-time
Rt	Resistance-time
e	Charge of electron
R^2	Correlation coefficient
V_{GS}	Gate to source voltage
V_{DS}	Drain to source voltage
I_D	Drain current
μA	Micro Ampere
V_{th}	Threshold voltage
I_{ON}	On current (drain)
SS	Subthreshold Swing
W	Channel width of transistor
Pt	Platinum
q	Charge of electron
^{o}	Degree
~	Approximately equal to