I would like to dedicate this dissertation to my family who has supported and encouraged me throughout this endeavour: thank you for your love and support throughout my entire life and helping me realize who I am today!

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It is certified that the work contained in the thesis titled "**Studies on Development of rGO Supported Chalcogenide Photoelectrocatalysts for Reduction of Water to Hydrogen by Visible Light"** by "**Rajiv Ranjan"** has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

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DECLARATION BY THE CANDIDATE

I, ***Rajiv Ranjan***, certify that the work embodied in this thesis is my own bonafide work and carried out by me under the supervision of ***Prof. A.S.K. Sinha*** from Oct-2012 to June-2019, at the ***Department of Chemical Engineering & Technology***, 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 wilfully 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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It is certified that the above statement made by the student is correct to the best of my knowledge.

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Date:

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List of notations, nomenclatures, symbols

ΔH	Heat of reaction
BE	Binding energy
C_I	Interface capicitance
CB	Conduction band
d_{hkl}	Interplanar spacing
e^-	Electron
E_{BE}	Energy of the involved bound electron state
E_F	Fermi energy
E_g	Band gap energy
E_{KE}	Energy of the ejected electron
d_{hkl}	Interplanar spacing
e^-	Electron
E_{BE}	Energy of the involved bound electron state
E_F	Fermi energy
E_g	Band gap energy
E_{KE}	Energy of the ejected electron
F	Faraday constant
FWHM	Full width at half maximum
GHG	Green House gases
GO	Graphene oxide
h	Plank constant
$h+$	Hole
IEA	International energy agency
J/year	Joule per year
k	Rate constant
K	Scherrer constant
MNRE	Ministry of new and renewable energy
Mtoe	Million tonnes
OSR	Oxidative steam reforming
PEC	Photo-electrochemical
POX	Partial oxidation reaction
PV	Photovoltaic
PZT	Piezoelectric transducers
R_I	Resistance associated at interface
rGO	Reduced graphene oxide

R_s	Resistance due to solution/ electrolyte
SR	Steam reforming
VB	Valence band
Z	Impedance
α	optical absorption coefficient
β	Broadening
λ	Wave length
v	Frequency of light
Φ_m	Work function of the metal
Φ_s	Work function of the semiconductor
Φ_b	Height of the potential barr

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