# OPTIMIZED FABRICATION OF $TiO_2$ NANOTUBE ARRAYS BY ANODIZATION FOR SOLAR CELL APPLICATIONS

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# OPTIMIZED FABRICATION OF $TiO_2$ NANOTUBE ARRAYS BY ANODIZATION FOR SOLAR CELL APPLICATIONS

**by**

**NYEIN NYEIN**

**Thesis submitted in fulfillment of the**
**requirements for the degree**
**of Doctor of Philosophy**

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## DECLARATION

I hereby declare that I have conducted, completed the research work and written the dissertation entitles "Optimized Fabrication of $TiO_2$ Nanotube Arrays by Anodization for Solar Cell Applications". I also declare that it has not been previously submitted for the award of any degree or diploma or other similar title of this for any other examining body or University.

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Date: 19th, April, 2017

Witnessed by

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Date: 19th, April, 2017

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| | |
|---|---|
| % | Percentage |
| < | Less than |
| > | Greater than |
| ° | Degree |
| °C | Degree Celsius |
| ml | Mililitre |
| wt% | Weight percentage |
| V | Voltage |
| g | Gram |
| h | Hour |
| s | Second |
| M | Molarity |
| $hv$ | Photon energy |
| $2\theta$ | Diffraction angle |
| Å | Angstrom ($10^{-10}$ m) |
| nm | Nanometer ($10^{-9}$ m) |
| μm | Micrometer ($10^{-6}$ m) |
| β | Full-width at half-maximum (radius) |
| $C$ | Capacitance |
| C' | Estimated capacitance |
| $e^-$ | Electrons |
| η | Photoconversion efficiency |
| $h^+$ | Holes |
| λ | Wavelength |
| α | Absorption coefficient |

| | |
|---|---|
| $\mu$ | Growth rate |
| $\theta$ | Bragg's angle |
| σ | Ionic conductivity |
| D | Crystallite size |
| S | Dye at the ground state |
| S* | Excited state |
| $S^+$ | Oxidized dye |
| $Z$ | Impedance |
| $Z'$ | Real impedance |
| $V_0^{\cdot\cdot}$ | Oxygen vacancies |