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## **CERTIFICATE**

This is certify that the thesis entitled “**INVESTIGATION OF STRUCTURAL, MORPHOLOGICAL, OPTICAL AND ANTIBACTERIAL PROPERTIES OF CARBOHYDRATE BIOTEMPLATE AND TRANSITION METAL DOPED ZINC OXIDE NANOSTRUCTURE MATERIALS**” submitted to the Bharathiar University, in partial fulfillment of the requirements for the award of the Degree of **DOCTOR OF PHILOSOPHY IN PHYSICS** is arecord of original research work done by Mrs. **A. DHANALAKSHMI (Reg. No: Ph.D. CB-JUL 2012-0307)** during the period 2012-2017 of her research in the Research & Development Centre, Bharathiar University, Coimbatore - 641 046 under my supervision and guidance and the thesis has not formed the basis for the award of any Degree/Diploma/Associateship/Fellowship or other similar title of any candidate of any University.

Date: 23.10.17

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Research & Development Centre

Bharathiar University

**Signature of the Guide**

(with seal)

**A. DHANALAKSHMI M.Sc., M.Phil.,**  
Ph.D. Research Scholar,  
School of Physics,  
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Coimbatore - 641 046.

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## **DECLARATION**

I **A. DHANALAKSHMI** hereby declare that the thesis, entitled “**INVESTIGATION OF STRUCTURAL, MORPHOLOGICAL, OPTICAL AND ANTIBACTERIAL PROPERTIES OF CARBOHYDRATE BIOTEMPLATE AND TRANSITION METAL DOPED ZINC OXIDE NANOSTRUCTURE MATERIALS** submitted to the Bharathiar University, Coimbatore in partial fulfillment of the requirements for the award of the Degree of **DOCTOR OF PHILOSOPHY IN PHYSICS** Is a record of original and independent research work done by me during 2012-2017 under the Supervision and Guidance of **Dr. B. NATARAJAN**, Assistant Professor, Department of Physics, Raja Doraisingam Govt. Arts College, Sivagangai and it has not formed the basis for the award of any Degree/Diploma/Associateship/Fellowship or other similar title to any candidate in any University

**Date: 23.10.17**

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## **CERTIFICATE OF GENUINENESS OF THE PUBLICATIONS**

1. This is to certify that the Ph.D. candidate Mrs. **A. DHANALAKSHMI** working under my supervision has published a research article in the refereed journal named **Carbohydrate Polymers** with Vol. No. **168** Page Nos. **191-200** and year of publication **2017** published by **Elsevier**. The content of the publication incorporates part of the results presented in her thesis.

2. This is to certify that the Ph.D. candidate Mrs. **A. DHANALAKSHMI** working under my supervision has published a research article in the refereed journal named **Journal of Materials Science: Materials in Electronics** with Vol. No. **28** Page Nos. **1-8** and year of publication **2017** published by **Springer**. The content of the publication incorporates part of the results presented in her thesis.

3. This is to certify that the Ph.D. candidate Mrs. **A. DHANALAKSHMI** working under my supervision has published a research article in the refereed journal named **Pramana Journal of Physics** with Vol. No. **87:57** Page Nos. **1-9** and year of publication **2016** published by **Indian Academy of Sciences**. The content of the publication incorporates part of the results presented in her thesis.

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2	Course of study	M.Phil., / Ph.D.,
3	Title of the Thesis / Dissertation	Investigation of Structural, Morphological, Optical and Antibacterial properties of Carbohydrate biotemplate and Transition metal doped Zinc Oxide Nanostructure materials
4	Name of the Supervisor	Dr. B. NATARAJAN
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