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It is certified that the work contained in the thesis titled “**Antibacterial and cellular response of polarized bioceramic substrates**” by **ANGARAJ SINGH** has been carried out under our supervision and that this work is not submitted elsewhere for any degree.

It is further certified that the student has satisfactorily fulfilled all the requirements of Comprehensive examination, Candidacy and SOTA for the award of the Ph.D. degree.

*Ashutosh Kumar Dubey*

**Dr. Ashutosh Kumar Dubey**

**(Supervisor)**  
Assistant Professor  
Department of Ceramic Engineering  
संशोधन विभाग  
Indian Institute of Technology (B.H.U.)  
IIT (BHU) Varanasi  
भारतीय प्रौद्योगिकी संस्थान (बि.एच.यू.)  
Varanasi-221005/वाराणसी-221005

## DECLARATION BY THE CANDIDATE

I, **Angaraj Singh** certify that the work embodied in this thesis is my own bona fide work carried out by me under the supervision of **Dr. Ashutosh Kumar Dubey, Assist. Professor** for a period of 5 years and 2 months from “**December 2015**” to “**February 2021**”, at the “**Department of Ceramic Engineering**”, IIT (BHU) Varanasi. The material contained in this thesis has not been submitted for the award of any other degree. 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 willfully 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.

**Date:** 10/03/2021

**Place:** Varanasi

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Angaraj Singh

(Angaraj Singh)

## CERTIFICATE BY THE SUPERVISOR

This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

.....  
Ashutosh Kumar

(Dr. Ashutosh Kumar Dubey)

Assistant Professor (सहायक प्राध्यापक)  
Department of Ceramic Engineering  
(Supervisor) सिरामिक अभियान्त्रिकी विभाग  
Indian Institute of Technology (B.H.U.)  
भारतीय प्रौद्योगिकी संस्थान (का०हि०वि०वि०)  
Varanasi-221005/वाराणसी-221005

.....  
[Signature]

Head of Ceramic Engineering Department

विभागाध्यक्ष/HEAD  
सिरामिक अभियान्त्रिकी विभाग  
Department of Ceramic Engineering  
भारतीय प्रौद्योगिकी संस्थान (का०हि०वि०वि०)  
Indian Institute of Technology (B.H.U.)  
Varanasi-221005/वाराणसी-221005

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**Date:** 10/03/2021

.....  
Angaraj Singh

**Place:** IIT (BHU) Varanasi

**(Angaraj Singh)**

**DEDICATED**  
**to**  
**My Beloved Parents**