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1.3.3 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

Dept: M.E -MFE **Academic Year: 2019-2020**

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PRINCIPAL
M.I.E.T. ENGINEERING COLLEGE
GUNDUR, TIRUCHIRAPPALLI-620 007.

MECHANICAL CHARACTERIZATION OF POLYPROPYLENE SURGICAL MESH

PHASE II REPORT

Submitted by

A.R. MAHA LAKSHMI

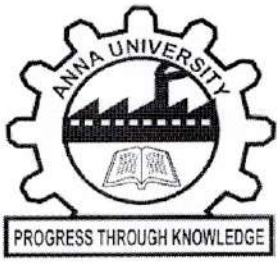
(812418410001)

In partial fulfillment for the award of the degree Of

MASTER OF ENGINEERING

IN

MANUFACTURING ENGİNEERING



M.I.E.T ENGINEERING COLLEGE, TRICHY

DEPARTMENT OF MECHANICAL ENGINEERING

ANNA UNIVERSITY :: CHENNAI 600025

SEPTEMBER 2020

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"MECHANICAL CHARACTERIZATION OF POLYPROPYLINE SURGICAL MESH"** is the bonafide work of **"A.R.MAHALAKSHMI"** who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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Submitted for the university Main project Viva-Voce (Phase II) held on ..22.09.2020

in **M.I.E.T ENGINEERING COLLEGE, Trichy.**

INTERNAL EXAMINER

EXTERNAL EXAMINER

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PRINCIPAL
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ABSTRACT

Surgical mesh materials made from fibres of polypropylene (PP) have been widely used for over fifty years. However in recent times the use of these materials has been called into question for certain surgical operations, known as "pelvic organ" or "transvaginal" procedures. The precise mechanical environment is difficult to quantify but a tentative conclusion is that failure by purely mechanical mechanisms (fatigue and creep) is unlikely. The stress corrosion is the most likely explanation but no experimental results exist to prove conclusively that this failure mechanism occurs in vivo. Further work is needed to resolve this urgent problem.

CHAPTER 11

11.1 CONCLUSION

Stress corrosion failure may be occurring in PP mesh in vivo. Currently the evidence is inconclusive and more work needs to be done. In particular, mechanical tests should be carried out on samples of mesh which have spent periods of time in vivo, both in human patients and in animal models. Only by this means will it be possible to demonstrate, or rule out, the presence of degradation causing embrittlement. Further work is also needed to quantify the mechanical behaviour of surgical mesh materials, especially their defect tolerance, fatigue, creep and stress-corrosion behaviour. Only then can they be reliably used in medical products.

CHARACTERIZATION AND MECHANICAL TESTING OF ZIRCONIA TOUGHENED ALUMINA

PHASE II REPORT

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In partial fulfillment for the award of the degree Of

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ABSTRACT

Hard tissue and bone replacements are synthesized mainly from materials having similar chemical, mechanical properties and phase structure to those of the hard tissues. Study on the synthesis of new biomaterials involves the use of the existing biomaterials with a new composite material with improved properties, modification of the microstructure of the present biomaterials and chemical synthesis to form a new novel biomaterial.

The objective of this present study is the preparation of Alumina ($Al2O_3$) toughened with Yttria stabilized ZrO_2 (3Y-PSZ) composite and to find out their potential application in load bearing implants. In this present work the following specific objectives has to be achieved:-

- Selection of appropriate concentration of Alumina and Yttria stabilized zirconia for preparing the composite by ball milling.
- The micro hardness test will be carried out to evaluate the hardness of the composite.
- The elemental composition and to determine the crystallographic properties of the prepared ZTA composites, Energy-Dispersive Xray Spectroscopy (EDS) and X-ray Diffraction Spectroscopy (XRD) analyses will be carried out.

Keywords: Bone replacements, $Al2O_3$ toughened with ZrO_2 (3Y-PSZ), Energy-Dispersive Xray Spectroscopy (EDS) and X-ray Diffraction Spectroscopy (XRD) analyses.

5.1 CONCLUSIONS

Synthesis of alumina-yttria stabilized zirconia composite has been achieved following techniques like powder metallurgy, ball milling and subsequent sintering. The optimum concentrations of samples were determined[17]. The alumina-yttria stabilized zirconia composite powders have been examined for optimization of particle size, particle morphology and phase analysis. The SEM studies reveal that the grain agglomerate with each other are quite well and is better in the 300 min ball milled composite. Hardness values are also impressive in order to withstand substantial amount of load. The phase analysis confirmed the presence of alumina after conversion via sintering in normal atmosphere. The biocompatibility test revealed that the samples are biocompatible and do not for toxic compounds in the body environment and hence can be used as a reliable option in load bearing implants.