



INTRODUCTION

There is a need for high performance orthopedic hip implants. The average lifespan of a load bearing implant for 9 out of 10 patients is 10-20 years.

Problem: A leading cause of implant failure is wear of load bearing surfaces.

Solution: The introduction of the novel ultra-hard ceramic Aluminum Magnesium Boride (AlMgB₁₄), also known as BAM, offers a new perspective.




Cytotoxicity Testing of AlMgB₁₄ for Medical Implant Applications

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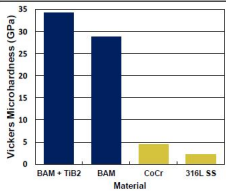
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CYTOTOXICITY TESTING
of AlMgB₁₄ Powders for Medical Implant Applications

BAM BACKGROUND

- High hardness, ranking third in the world (next to cBN & diamond)
- Light-weight
- Cost efficient
- Coefficient of sliding friction of 0.02
- Due to its unique properties, BAM is of interest for multiple applications/industries such as medical, aerospace, military, automotive, industrial, and sports.



Material	Vickers Microhardness (GPa)
BAM + TiB2	~33
BAM	~28
CoCr	~5
316L SS	~2

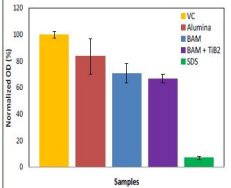
CYTOTOXICITY TESTING
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Why study the cytotoxicity of BAM?

- BAM is super hard → implication for wear surface in load bearing implants.
- Composition and processing will likely influence biocompatibility.

Problem: While hardness is a function of processing, and composition is understood, there is very little (if any) information regarding the biocompatibility or cytotoxicity of BAM.

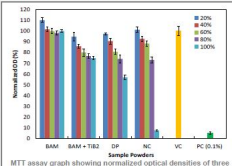
CYTOTOXICITY TESTING: SOLID SAMPLES



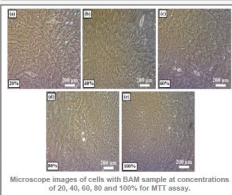
Samples	Normalized OD (mg)
VC	~100
Alumina	~80
BAM	~70
BAM + TiB2	~65
SOS	~10

MTT direct contact assay graph showing normalized optical densities of two BAM samples, NC, PC, and VC.

CYTOTOXICITY TESTING: POWDER EXTRACTS



MTT assay graph showing normalized optical densities of three BAM sample powders, NC, PC, and VC.



Microscope images of cells with BAM sample at concentrations of 20, 40, 60, 80 and 100% for MTT assay.

CONCLUSION:
Cytotoxicity testing and optical microscopy images of BAM in both powder and solid form show no signs of cytotoxicity.

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