Development of a new bone scaffold for the treatment of large bone defects

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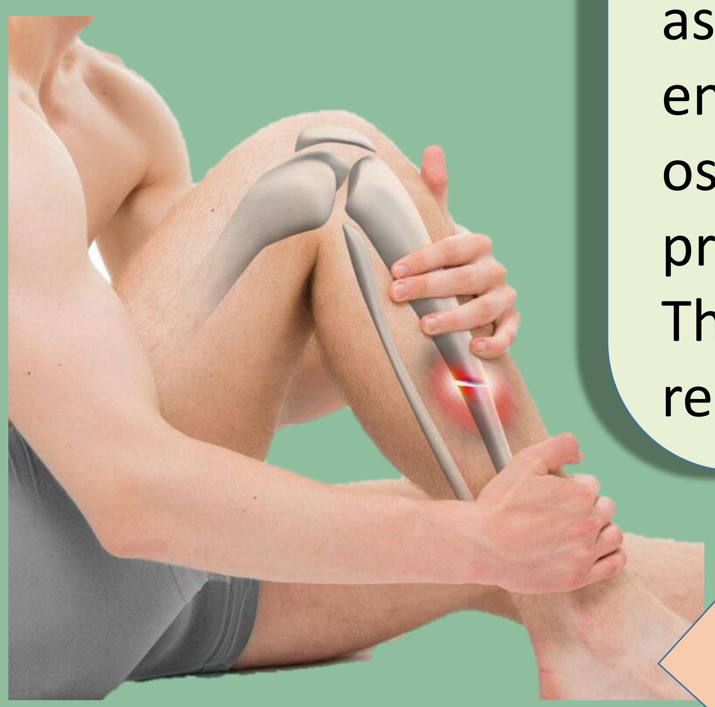
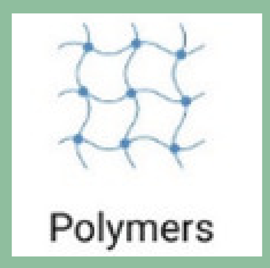
Introduction:

Large bone defects remains a major problem in orthopaedic surgery despite these advances in medical techniques. To date, autogenous bone grafting is still commonly therapeutic standard. However, it presents some limitations associated with available bone volume, other complications and severe morbidity at the donor site. Bone tissue engineering has become one of promising methods to treat large bone defect due to its flexibility, biocompatible and osteoinductive. Composite scaffold with different formulations were prepared by the UV cross-link, and the properties of scaffolds were characterised by Fourier transform infrared (FTIR) spectroscopy and compression testing. The aim of this project is using biodegradable Composite scaffold to stimulate bone regeneration by controlling the releasing of active pharmaceutical ingredients.





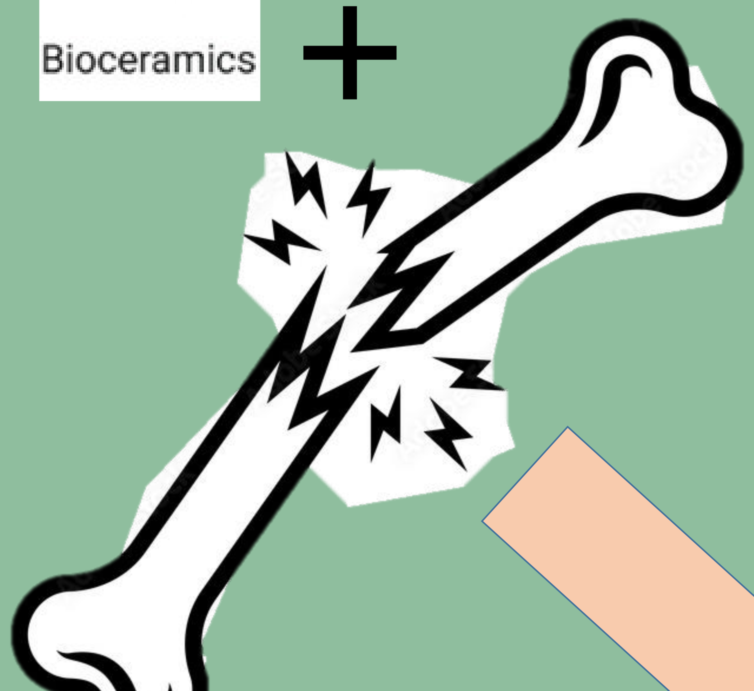
MW of polymer	Ceramics 1	Ceramic 2	volume of acid	No.
HW	1.5	0	12.5	A
HW	0.75	0.75	12.5	G
HW	0	1.5	12.5	E
HW	0	1.5	20	L
HW	0	1.5	30	R

Methods:

The Fourier transform infrared (FTIR) spectroscopy is based upon the absorption of IR radiation during vibrational transitions in covalently bound atoms.

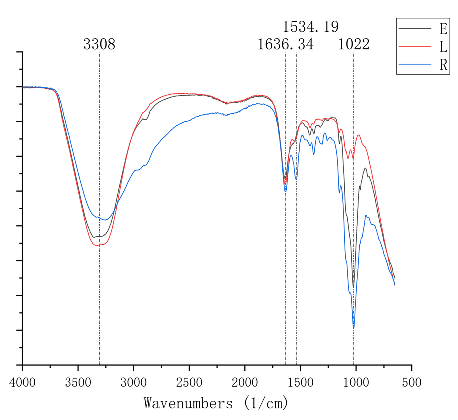
The mechanical properties of different composites will be assessed using compression testing.

Swelling behaviour is an intrinsic property of hydrogels, where the nanogels enlarge due to solvent penetration into the void space between the polymeric chain network.

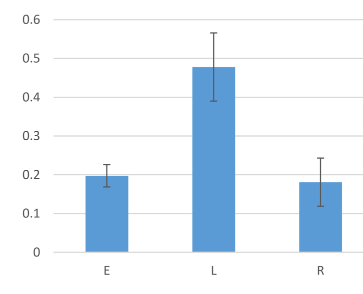


Bone regeneration

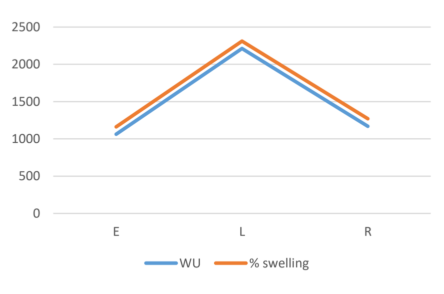
Different volume of acid:



FT-IR

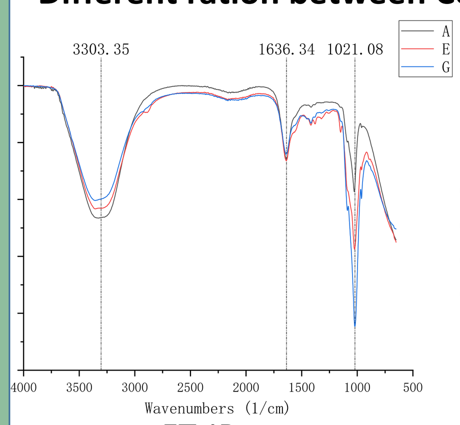


Compression test

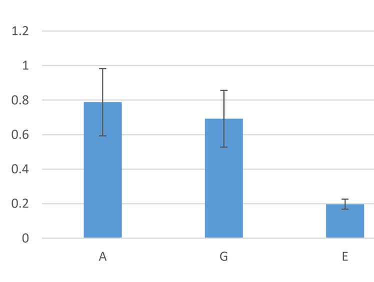


Swelling study

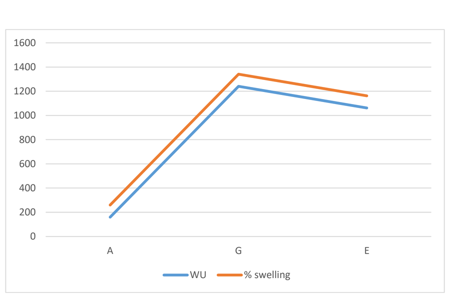
Different ration between Ceramics 1 and 2:



FT-IR



Compression test



Swelling study

Conclusion:

In the present work we studied the mechanical strength of the composite scaffold crosslinked in the presence of an initiator. It was found that the volume of initiator effects the cross-linking reaction as evidenced by changes to the intensity of peaks in the FTIR spectra.

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