Biomaterials Translational

VOL 03

生物材料转化电子杂志（英文）
Volume 3 Issue 2 June 2022

3D-Printed Implants
Reconstruction of large bone defects after bone tumour resection

Additive Manufacturing of PEEK Scaffolds
Biomechanical consideration in AM translation

Decellularized ECM Bio-Inks
Unique properties for cartilage tissue engineering

ISSN 2096-112X
CN 11-9367/R

Responsible Institution
National Health Commission of the People's Republic of China

Sponsor
Chinese Medical Association
42 Dongsi Xidajie, Beijing 100710, China

Publishing
Chinese Medical Multimedia Press Co. , Ltd.
62 Dongheyan Street, Beijing 100052, China
Tel: 0086-10-51322622

Executed by
Union Hospital Affiliated to Tongji Medical College of Huazhong University of Science and Technology
1277 Jiefang Avenue, Wuhan, Hubei Province, China

Editing
Editorial Office of *Biomaterials Translational*

Websites
http://www.biomat-trans.com/

Online Submission
https://www.editorialmanager.com/biomater_transl/

Contact
1277 Jiefang Avenue, Wuhan, Hubei Province, China
Email: editors@biomat-trans.com
Tel: 0086-13437105155

Periodical Registration
ISSN 2096-112X
CN 11-9367/R

Biomaterials Translational is an electronic journal, which will be printed on demand of readers.

Advances in 3D printing have opened new possibilities to fabricate biomedical devices or constructs with synergistic biological and mechanical properties that can mimic the natural tissue structures and physiological environment, as highlighted by Seyed Ataollah Naghavi et al. in their Research Article on page 142.

Cover image: by Florence R. Wang

Biomaterials Translational is an international journal publishing research at the interface of translational medicine, biomaterials science and engineering. The journal publishes original, high-quality, peer-reviewed papers including original research articles, reviews, viewpoints and comments. Translational medicine is an interdisciplinary field that applies emerging new technologies and sciences to the prevention, diagnosis and treatment of human disease, with a particular focus on animal disease models in the application of biomaterials for treatments. Thus, the journal highlights breakthrough discoveries in basic science and clinical application of biomaterials, as well as other significant findings related to the translation of biomaterials.

The scope of the journal covers a wide range of physical, biological and chemical sciences that underpin the design of biomaterials and the clinical disciplines in which they are used.

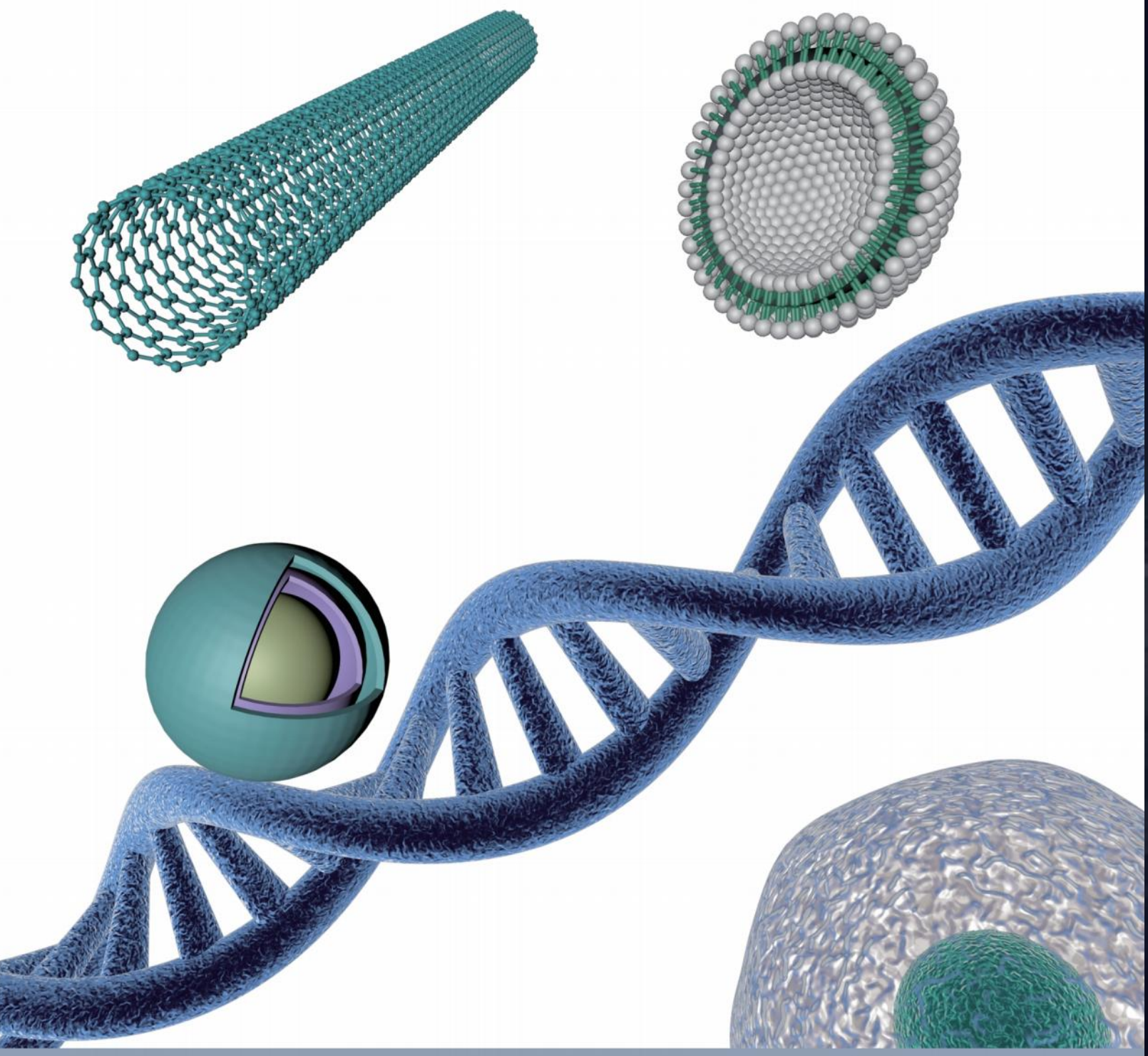
Original articles will be considered for publication within, but not limited to, the following domains:

- Investigation of human biology and pathogenesis of diseases with potential applications of biomaterials in treatment
- Synthesis, characterization and biomedical potential of metallic, ceramic, polymeric, composite and hybrid biomaterials
- Physical, chemical, biological, pharmaceutical and toxicological features of biomaterials
- Drug and gene delivery system design, with a focus on its application to disease conditions
- Short-term and long-term biocompatibility of biomaterials
- *In vivo* disease models and the biology of the host response in application of novel biomaterials
- Biomaterials design for modern diagnosis and therapeutic clinical practice (bioimaging, biosensing, biotherapy)
- Stem cell–biomaterial-based tissue engineering

THE FIRST EDITORIAL BOARD

Biomaterials Translational

The new vehicle of translational medicine:
www.biomat-trans.com



submit your best research at
www.editorialmanager.com/biomater_transl/

ISSN 2096-112X

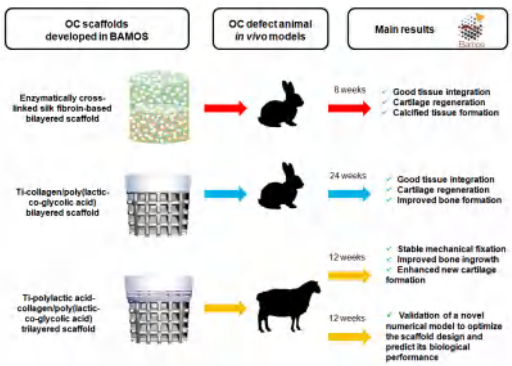
Biomaterials Translational

Contents

Quarterly Established in December 2020. Volume 3, Issue 2 June 28, 2022

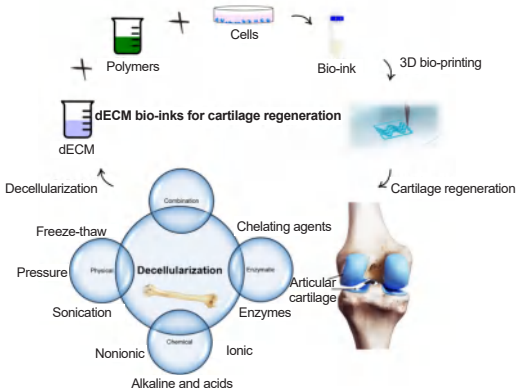
Editorial

Viewpoint

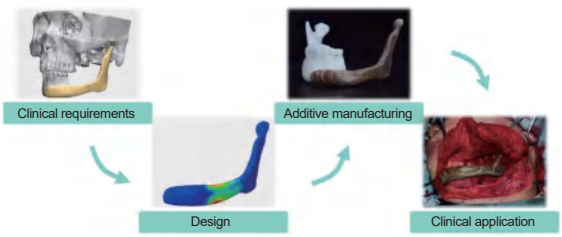


The main results of the *in vivo* evaluations carried out in Biomaterials and Additive Manufacturing: Osteochondral Scaffold (BAMOS) project, funded under Horizon 2020 Research and Innovation Staff Exchanges (RISE) program, are summarized. Animal models of osteochondral defect have been used to assess the biological performance of the different multi-material and multi-layered scaffolds developed.

Reviews

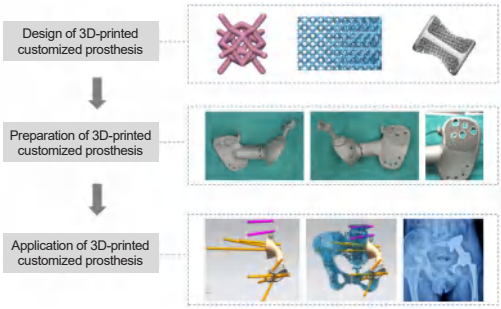


Decellularized extracellular matrix (dECM) can be used as a potential bio-ink for cartilage tissue engineering. This bioink can provide natural cues for cell adhesion and tissue regeneration. Here, the properties, sources, preparation process of dECM bio-inks, and previous studies on dECM bio-ink bio-printing for cartilage regeneration were reviewed.

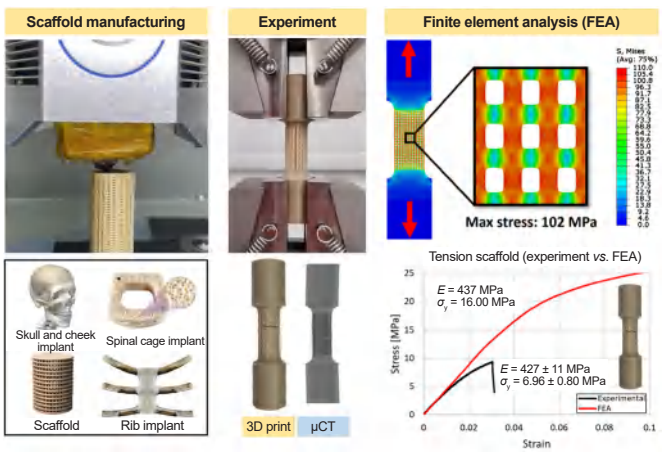


Polyether-ether-ketone (PEEK) is a candidate material for the manufacture of next-generation orthopaedic implants. Customised PEEK implants have been used in clinical applications with the development of additive manufacturing. The design, manufacturing, evaluation and typical applications of PEEK customised implants are comprehensively reviewed.

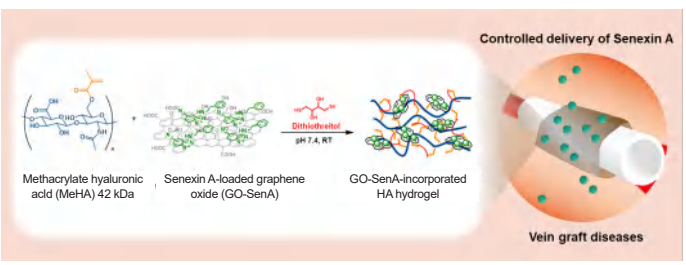
RESEARCH ARTICLES



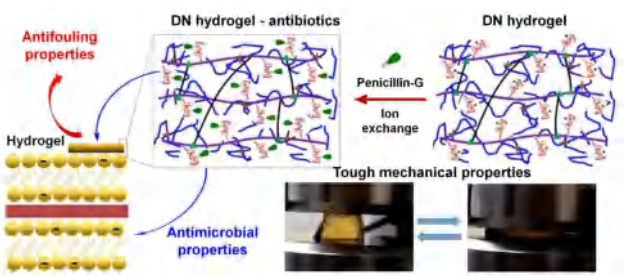
Three-dimensional (3D)-printed prostheses with an individualised design can achieve satisfactory short-term clinical efficacy in the reconstruction of large bone defects after bone tumour resection. Using this method it is possible to print complex structures that are difficult to fabricate using traditional processes, and overcome the problems of stress shielding and low biological activity of conventional prostheses.



Polyether-ether-ketone is an excellent biomaterial that has potential in orthopaedic applications. Additive Manufacturing has been widely used in fabrication of customer-tailored implants such as skull, spinal cage, rib cage, and scaffold for large bone defect reconstructions. The achieved mechanical performance of the implants is a key factor for translation of additive manufacturing. In this study, the compression, tension, three-point bending and torsion specimens were designed and additive manufacturing manufactured. The mechanical properties were tested and compared with the computational results.



This study demonstrates a novel biodegradable graphene-incorporated hyaluronic acid-based hydrogel that can effectively accommodate and deliver the cyclin-dependent kinase 8/19 inhibitor Senexin A to the adventitia of vessel grafts without any observed toxicity *in vitro*. The versatility of this hydrogel system supports its potential translation as a perivascular drug delivery system for treating occlusive vascular diseases.



Metallopolymer double-network (DN) hydrogels, composed of a first network of cationic cobaltocenium polyelectrolytes and a second network of polyacrylamide, are fabricated via two-step free radical polymerization. After installation with antibiotics, the hydrogel conjugates show remarkable mechanical ability, antifouling and antimicrobial properties.