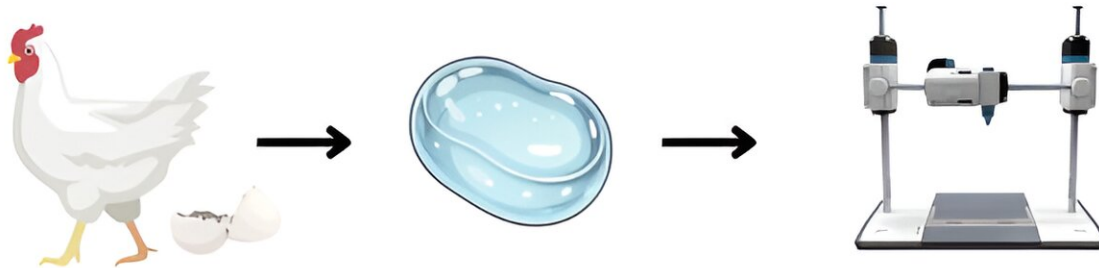


Scientists develop revolutionary egg white-based bioink for advanced tissue engineering

July 29 2024

EGG-WHITE-BASED PHOTOCROSSLINKABLE HYDROGEL USED FOR 3D PRINTING



Egg white-based bioink for advanced tissue engineering. Credit: Terasaki Institute

Terasaki Institute scientists have created a nature-inspired cutting-edge technology by developing a novel bioink derived from egg whites or egg white methacryloyl (EWMA). A paper describing their work is [published](#) in the journal *Advanced Functional Materials*.

Bioinks are mainly used in 3D bioprinting to create [artificial tissues](#).

These natural or synthetic materials support living cells, aiding their adhesion, growth, and differentiation. They are essential for developing complex tissue structures for medical research, drug testing, and organ transplantation. This novel EWMA bioink represents a promising addition to this field, offering a unique combination of properties that address many challenges faced in tissue engineering.

The team created a photocrosslinkable bioink from [egg whites](#) through methacryloyl modification. This EWMA bioink offers several advantages that make it suitable for bioprinting applications. It provides abundant proteins, ensuring a nutrient-rich environment for cell growth. This bioink exhibits excellent biocompatibility and bioactivity, crucial for successful tissue engineering.

The EWMA bioink exhibits properties such as flexibility that allow researchers to fine-tune the material's characteristics to match the specific requirements of multi-tissue structures that closely mimic natural biological systems. EWMA bioinks possess intrinsic antiviral and antibacterial properties. These inherent features provide an added layer of protection against potential infections, which is particularly valuable in medical applications.

The implications of this study extend far beyond the laboratory. EWMA bioinks could potentially be used to create more accurate tissue models for [drug testing](#), reducing the need for animal trials. In the long term, this technology can contribute toward developing functional tissue replacements for regenerative medicine applications.

According to Dr. Ali Khademhosseini, CEO at TIBI and an expert in bioengineering, "This innovative approach to creating bioinks from egg whites demonstrates the immense potential of bio-inspired materials in tissue engineering. By harnessing readily available natural resources and enhancing them through clever chemical modifications, we're opening

new avenues for personalized regenerative medicine. Such breakthroughs are crucial in our quest to develop more effective and accessible solutions for organ failure, cardiovascular disease, and cancer treatments."

As research advances, we anticipate further improvements and uses for EWMA bioink. This breakthrough showcases the innovative drive in tissue engineering and the potential of bio-inspired materials to tackle complex medical issues. The development of EWMA [bioink](#) marks a significant step towards more effective and versatile bioprinting techniques. As scientists continue exploring and expanding this technology, we may enter a new era in [tissue engineering](#) and regenerative medicine.

Authors include Mahboobeh Mahmoodi, Mohammad Ali Darabi, Neda Mohaghegh, Ahmet Erdem, Amir Ahari, Reza Abbasgholizadeh, Maryam Tavafoghi, Vahid Hosseini, Javed Iqbal, Reihaneh Haghniaz, Hossein Montazerian, Jamileh Jahangiry, Fatemeh Nasrolahi, Arshia Mirjafari, Erik Pagan, Mohsen Akbari, Hojae Bae, Johnson V. John, Hossein Heidari, Ali Khademhosseini, and Alireza Hassani Najafabadi

More information: Mahboobeh Mahmoodi et al, Egg White Photocrosslinkable Hydrogels as Versatile Bioinks for Advanced Tissue Engineering Applications, *Advanced Functional Materials* (2024). [DOI: 10.1002/adfm.202315040](https://doi.org/10.1002/adfm.202315040)

Provided by Terasaki Institute for Biomedical Innovation

Citation: Scientists develop revolutionary egg white-based bioink for advanced tissue engineering (2024, July 29) retrieved 29 July 2024 from <https://phys.org/news/2024-07-scientists-revolutionary-egg-white-based.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.