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Nanostructured Extracellular Matrices for Biomedical and Food Applications

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Collagen (Col) is the most abundant protein in the human body and one of the main components of stromal tissues in tumors which have a high elastic modulus of over 50 kPa. Although collagen has been widely used as a cell culture scaffold for cancer cells, there have been limitations when attempting to fabricate a tough collagen gel with cells like a cancer stroma.

Here, we demonstrate rapid gelation of a collagen solution within a few minutes by transition metal (TM) complexation^[1]. Type I collagen solution at neutral pH showed rapid gelation with a transparency of 81 % and a high modulus of 1,781 kPa by mixing with K₂PtCl₄ solution within 3 min. This technology will be useful as a new class of 3D culture for cells and organoids due to its facility for deep-live observation and mechanical stiffness adjustment. We will show our recent progress of *in situ* formation of cells and collagen nanofibrils assemblies for biofabrication of the strongly oriented muscle tissues.

References:

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Short Bibliography



Michiya Matsusaki was born in Kagoshima, Japan in 1976. He received his Ph.D. degree in 2003 from Kagoshima University. He started his academic career as a Postdoctoral fellow at Osaka University in 2003. He was a visiting scientist at Lund University in 2004. In 2006, he joined the Department of Applied Chemistry in the Graduate School of Engineering at Osaka University as an Assistant Professor. He was promoted to Associate Professor in 2015 and to full Professor in 2019. He was a JST-PRESTO researcher (Concurrent position) from 2008 to 2011 and from 2015 to 2019. He was awarded 22 awards including Osaka Science Award and the Young Scientist's Prize by MEXT. His research interest is biomaterials and tissue engineering for regenerative medicine and pharmaceutical applications.