



## Various Approaches to Promote Tissue Regeneration with Multifunctional 2D Nanomaterials



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### **Abstract**

The emergence of 2D nanomaterials (2D NMs), which was initiated by the isolation of graphene (G) in 2004, revolutionized various biomedical applications, including bio-imaging and -sensing, drug delivery, and tissue engineering (TE), owing to their unique physicochemical and biological properties. Building on the success of G, a novel class of monoelemental 2D NMs, known as Xenex, recently emerged, offering distinct advantages in the fields of TE and regenerative medicine. In this presentation, I focus on the comparison of G and Xene materials for use in fabricating TE scaffolds. After a brief introduction to the basic physicochemical properties of these materials, recent representative studies are classified in terms of the engineered tissue, i.e., bone, neural, muscle, and skin tissues. I analyze several methods of improving the clinical potential of Xene-laden scaffolds using state-of-the-art fabrication technologies and innovative biomaterials. Despite the considerable advantages of Xene materials, critical concerns, such as biocompatibility, biodistribution and regulatory challenges, should be considered. This presentation and collaborative efforts should advance the field of Xene-based TE and enable innovative, effective solutions for use in future tissue regeneration.

### **Biography**

Prof. Dong-Wook Han obtained his PhD degree from the graduate program of biomedical engineering at Yonsei University, Seoul, South Korea in 2004. After undertaking a postdoctoral fellowship at the Institute for Frontier Medical Sciences, Kyoto University, Japan from 2005 to 2007, he joined the faculty of Pusan National University (PNU), where he began his academic career, and is currently a full professor in the Department of Cogno-Mechatronics Engineering at PNU. Since 2008, Prof. Han has authored or co-authored over 250 scientific publications and joined several book chapters, and holds more than 25 international and domestic patents. His research interest concerns 'BT-NT convergence', especially tissue engineering and regenerative medicine with smart nanobiomaterials and 3D printing and photobiomodulation, development of medical devices and patterned cell chips, and assessment of nanomaterials toxicity (nanotoxicity).

\*\*\* ALL ARE WELCOME \*\*\*

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