



## Prof. Kiju Kang

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### A novel micro-architected material, Shellular in a minimal surface

September 18 | Bldg. 101  
Wednesday, 2 PM | Seminar Room on the 1<sup>st</sup> floor

**Abstract:** Shellular is an ultralight and micro-architected material, composed of a single thin, smooth, continuous shell. In the form of a triply periodic minimal surface (TPMS), a Shellular exhibits superior strengths, because it has a constant curvature over the entire shell without stress concentration, and supports a load only by means of coplanar stresses, i.e., deforms stretching-dominated. Thus, the surface roughness that inevitably occurs during an additive manufacturing likely significantly decrease the strength and stiffness of a Shellular. A TPMS Shellular divides space into two sub-volumes that are equivalent, independent of, and intertwined with each other. Hence, it can play a role as an interface that blocks or transfers mass or heat between two sub-volumes in addition to supporting an external load. In this talk, the properties, fabrication methods, and potential applications are elaborated.

#### References:

- [1] S.C. Han, J.W. Lee, K. Kang, *Advanced Materials*, 27, 5506 (2015)
- [2] S. Hyde, et al., *The Language of Shape* (Elsevier, 1996).
- [3] O. Al-Ketan, et al., *Additive Manufacturing* 19, 167 (2018)
- [4] M.G. Lee, et al., *Acta Materialia*, 103, 595 (2016)
- [5] S.C. Han, K. Kang, *Materials Today*, in print (2019)

Kiju Kang received the PhD degree from KAIST in 1988 and joined Chonnam National University in 1989. He worked with Prof. Fleck and Ashby in Cambridge university as a postdoc for one year from 1991, and with Prof. A.G. Evans in Princeton university for one year from 2000. Since 2005, Prof. Kang has studied mechanical metamaterials, whose superior properties are attributed to their geometrical structure rather than their chemical composition. First, his attention was focused on development of wire-woven cellular metals for tens years, and achieved about 50 patents and 50 papers. After wrapped up the study of wire-woven metals with a review paper published in Progress in Materials Science, his attention was shifted to development and application of even the lighter mechanical metamaterial, named Shellular, since 2015.

**You are cordially invited to attend!**

Special Guest Seminar