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## **Professor Bong Joong Kim selected for the 2020 National Research and Development (R&D) Excellence Award as one of the 100 Best Researcher**

- GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Materials Science and Engineering Professor Bong Joong Kim was selected for the 2020 National Research and Development (R&D) Excellence Award as one of the 100 Best Researcher by the Ministry of Science and ICT and the Korea Institute of S&T Evaluation and Planning.
  - The '2020 National Research and Development (R&D) Excellence Award' includes the results of all state-funded research in 2019: △ machinery · materials △ life · ocean △ energy · environment △ information · electronics △ convergence △ pure science · infrastructure, and 100 research studies showing excellence in terms of technological and economic ripple effects will be selected and published for each field.
- Professor Bong Joong Kim was selected for his research achievement in the field of machinery · materials by "developing a capacitor that has a low permittivity comparable to that of air and recovers from electrical/genetic destruction by itself."
  - The results of this research show that the dielectric constant is low at the air level, and the characteristics of dielectric breakdown strength\* and ultra low-k dielectric\*\* are stably maintained during compression deformation, and it is the world's first 3D-nanolattice\*\*\* capacitor that recovers itself when stress is removed even if failure occurs.

\* dielectric breakdown strength: Insulation breakdown is a phenomenon in which the electrical resistance between electrically insulated materials is reduced and a large amount of current flows. The dielectric breakdown strength is about how much the insulation properties of an insulating material can be maintained, and the strength is expressed as the dielectric breakdown voltage value for power frequency voltage and impulse voltage.

\*\* ultra low-k dielectric: a substance having a low dielectric constant (a physical unit representing the effect of medium between charges on electric fields when electric fields act between electric charges) of less than 1.5

\*\*\* 3D-nanolattice: 3D-nanolattice structure in which ceramic nanotubes are regularly arranged in unit cell form using sophisticated 3D laser printing and ALD (atomic layer deposition) technology and is a metamaterial with low dielectric constant almost air level and excellent mechanical strength

- Compared to a thin film structure that breaks immediately upon application of voltage even if only 17% porosity is given, the 3D-nanolattice capacitor developed in this study with a porosity of 99% is stable even at a voltage of 200V, so its electrical strength is very strong. The research results were published online on July 12, 2019, in *Nano Letters*, the most authoritative journal in the nanotechnology field, and the related technology was registered as a patent in the same year.

□ Professor Bong Joong Kim said, "This is the first case of quantifying the dielectric/electrical properties of ultra-low dielectric materials according to stress, which no one has yet reached at home or abroad, and identifying their mechanisms. In the future, it is expected to be used in flexible electronic systems or next-generation electronic systems that can recover information lost due to electric/mechanical shocks."

- In addition, Professor Kim added, "The plan is to create a completely low dielectric nanolattice capacitor that does not degrade electrically, genetically, or mechanically even in repetitive stress cycles to be used in high voltage systems."

□ Those selected for the 2020 National Research and Development (R&D) Excellence Award as one of the 100 Best Researcher will be awarded a certificate and a signboard from the Minister of Science and ICT, and additional points will be awarded in the evaluation of projects at their institutions in accordance with related regulations. In addition, the selected researchers are recommended as candidates for national R&D performance appraisal merit awards (honor packaging, presidential citation, prime minister citation, etc.) and receive benefits such as receiving preferential treatment in selecting new R&D projects.



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