High fracture strength of alumina hollow nanostructures for high-efficiency GaN LEDs

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In the present study, we set out to show that α-alumina hollow nanoshell structure can exhibit an ultrahigh fracture strength even though it contains a significant number of nanopores. By systematically performing insitu mechanical testing and finite element simulations, the high fracture strength of an α-alumina hollow nanoshell structure can be explained in terms of conventional fracture mechanics even at the nanoscales. More importantly, by deriving a fundamental understanding, we would be able to lay down predictions and guidelines for the design of reliable ceramic nanostructures for advanced GaN LEDs. To that end, we demonstrated how our ultra-strong α-alumina hollow nanoshell structures could be successfully incorporated into GaN LEDs, thereby greatly improving the luminous efficiency and output power of the LEDs

Speaker Biography

Choi is an AssociateProfessor in the department of materials science and engineering at Seou National University. He earned his BS degree from Seoul National University, MS degree from Stanford University and Ph.D. degree from MIT in Materials Science and Engineering. He conducted his postdoctoral research at Karlsruhe Institute of Technology in Germany and then worked as a principal research scientist at Korea Institute of Science and Technology (KIST) before joining the Seoul National University. He is currently serving as editorial board members in several domestic and international journals. At present, his work focuses on developing advanced structure materials for extreme condition.

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