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Dr. Chang-Lyoul Lee's joint-research team develops a solvent vapor annealing process to increase the luminous efficiency of perovskite thin films

- GIST (President Kiseon Kim) – A research team led by Dr. Chang-Lyoul Lee at the Advanced Research Photonics Research Institute (APRI, Director Hyyong Suk) and Professor Hong Seok Lee of the Chonbuk National University Department of Physics developed a solvent vapor annealing process to increase the luminous efficiency of perovskite thin films.
 - The researchers also developed a method to control emission wavelength and luminous efficiency by controlling crystal size in perovskite film according to exposure time for polar solvent vapor.
- Perovskite has attracted attention as a high-purity light-emitting material for next-generation displays because of its high electrical conductivity and ease of production due to its simple solution process. However, the perovskite material is large in size, micrometer-level, which prevents light-emitting electrons from being easily combined and dissipated, which poses an obstacle to the optimization and application of materials.

- The researchers treated the perovskite thin film with a solvent vapor annealing process. Through this recrystallization process, the reaction of PbBr₂ and CH₃NH₃Br, which are the unreacted precursors remaining in the inside of the perovskite thin film, is induced to improve the crystallinity of the material, and the size of the crystal is very small, tens of nanometers, and the light-emitting electrons are confined, resulting in a luminous efficiency increase of more than 100 times.
 - The emission wavelength of the perovskite thin film can be controlled by controlling the size of crystals in the perovskite thin film to a few nanometers by using the new solvent vapor annealing process.
- GIST Dr. Chang-Lyoul Lee said, "In addition to improving the crystallinity through recrystallization in the perovskite thin film and ensuring high luminescence efficiency, it is possible to control delicate luminescence characteristics by controlling the quantum confinement effect, which is an advantage in the commercialization of the perovskite material."
- Chonbuk National University Professor Hong Seok Lee said, "Through this research, we have developed technology that can utilize perovskite material for solar cell as well as luminescent material in displays, and we expect that the perovskite material will be utilized in various applications in the future."
- This research was led by GIST Dr. Chang-Lyoul and Chonbuk National University Professor Hong Seok Lee as corresponding authors with Sang-Hyun Chin and Jin Whoo Choi as the first authors. The research was supported by supported by a National Research Foundation of Korea and by GIST and was published in Nanoscale on April 4, 2019.

