세미나 초록

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발표 주제	Optical-Electrical Characterization of Multidimensional Metal Halides for AIoT Applications
발표 내용	Organometallic halides have garnered attention due to their exceptional and promising energy conversion efficiency in the photovoltaic field. Recently, organic-inorganic lead halide perovskites have emerged as potential emissive materials for light-emitting devices, such as light-emitting diodes (LEDs) and lasers. This development underscores the importance of understanding their fundamental opto-physical properties. This study explores the temperature-dependent photoluminescence of CH3NH3PbBr3 perovskite quantum dots (QDs), polycrystalline thin films (TFs), and single crystals (SCs). It investigates opto-physical properties, including exciton-phonon scattering, exciton binding energy, and exciton decay dynamics. Our findings reveal that the primary non-radiative exciton decay pathway in QDs involves phonon-assisted thermal escape, while in TFs and SCs, it involves thermal dissociation due to low exciton binding energy. Based on these insights, various multidimensional metal halides were synthesized and applied in diverse IoT applications such as gas sensors, solar cells, and LEDs have been developed. Furthermore, by utilizing their ionic properties, a memristor suitable for AI has been developed, bringing us a step closer to standalone AIoT applications.