

## Breaking Sensitivity Barriers: Perovskite Based Gas Sensors With Dimethylacetamide-Dimethyl Sulfoxide Solvent Mixture Strategy

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**Abstract :** Perovskite-based gas sensors represent a highly promising materials within the realm of gas sensing technology, with a particular focus on detecting ammonia (NH<sub>3</sub>) due to its potential hazards. Our work conducted thorough comparison of various solvents, including dimethylformamide (DMF), DMF-dimethyl sulfoxide (DMSO), dimethylacetamide (DMAC), and DMAC-DMSO, for the preparation of our perovskite solution (MAPbI<sub>3</sub>). Significantly, we achieved an exceptional response at 10 ppm of ammonia gas by employing a binary solvent mixture of DMAC-DMSO. In contrast to prior reports that relied on single solvents for MAPbI<sub>3</sub> precursor preparation, our approach using mixed solvents demonstrated a marked improvement in gas sensing performance. We attained enhanced surface coverage, a reduction in pinhole occurrences, and precise control over grain size in our perovskite films through the careful selection and mixtures of appropriate solvents. This study shows a promising potential of employing binary and multi-solvent mixture strategies as a means to propel advancements in gas sensor technology, opening up new opportunities for practical applications in environmental monitoring and industrial safety.

**Keywords :** sensors, binary solvents, ammonia, sensitivity, grain size, pinholes, surface coverage

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