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| **Title:** | **Highly Sensitive and Fast Responsive Humidity Sensor based on 2D PtSe2 with Gamma Radiation Tolerance** | | |
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| **Published Journal Name:** | Advanced Materials Technologies | | |
| **Type of Publication:** | Journal | | |
| **Volume:** | 7 | Issue | 1 |
| **Publisher:** | Advanced Materials | | |
| **Publication Date:** | September 14, 2021 | | |
| **ISSN:** | 2365-709X | | |
| **DOI:** | https://doi.org/10.1002/admt.202100751 | | |
| **URL:** | https://onlinelibrary.wiley.com/doi/epdf/10.1002/admt.202100751 | | |
| **Other Related Info.:** | Page 2100751 (1 – 10) | | |
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| **Abstract:** |  |
| 2D transition-metal dichalcogenides (TMDs) with their unique properties have accelerated the study of emerging sensors and nanoelectronics to embed in various industries including severe environments such as nuclear power plant, low Earth orbit, and space. Therefore, a systematic investigation of the sensing properties and ionizing radiation effect on 2D TMDs is required. This study reveals a facile humidity sensor based on 2D platinum diselenide (PtSe2), and the effect of a high dose of gamma (γ-ray) radiation on their physical and electrical properties. The proposed humidity sensor exhibits notable variation of current signal up to 105 orders under the relative humidity (RH) range of 20–85% and a fast response time of 60 ms. The real-time electrical output of the PtSe2 during irradiation by 10 kGy of γ-rays (60Co), followed by material characterization confirms their unique stability under gamma radiation. Furthermore, precise and fast detection of moisture by the proposed PtSe2-based humidity sensor is demonstrated as a potential leak locator application. | |