Light Science & Applications

Advancing Optical Storage: Deep-Trap Phosphors for Rapid Data Recording and Retrieval

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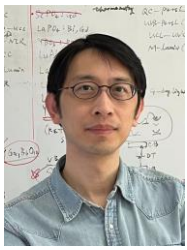
Optical storage has fundamentally changed how we manage data, but it grapples with speed and accessibility challenges. This study introduces a novel approach utilizing deep-trap phosphors, specifically focusing on $Mg_3Y_2Ge_3O_{12}:Pr^{3+}$, Yb^{3+}, and its capabilities in upconversion charging (UCC) and afterglow rejuvenation. By leveraging a 450 nm blue laser, we efficiently fill both shallow and deep traps, facilitating swift data recording. Importantly, we have discovered that stored energy can seamlessly transfer from deep to shallow traps through optical stimulation, revitalizing afterglow for effortless data retrieval. This process achieves an impressive recording speed of 0.01 seconds per bit and sustains data integrity for extended periods at room temperature. Moreover, the stored information can be easily retrieved after exposure to general ambient lighting, highlighting the tremendous potential of this approach in optical storage. These groundbreaking findings propel optical storage technology to new heights, promising boundless potential for future advancements.



Short Bio:

Feng Liu obtained his Ph.D. from the Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences. He currently serves as a Professor at Northeast Normal University, China.