Researchers develop photostimulated transparent glass ceramic

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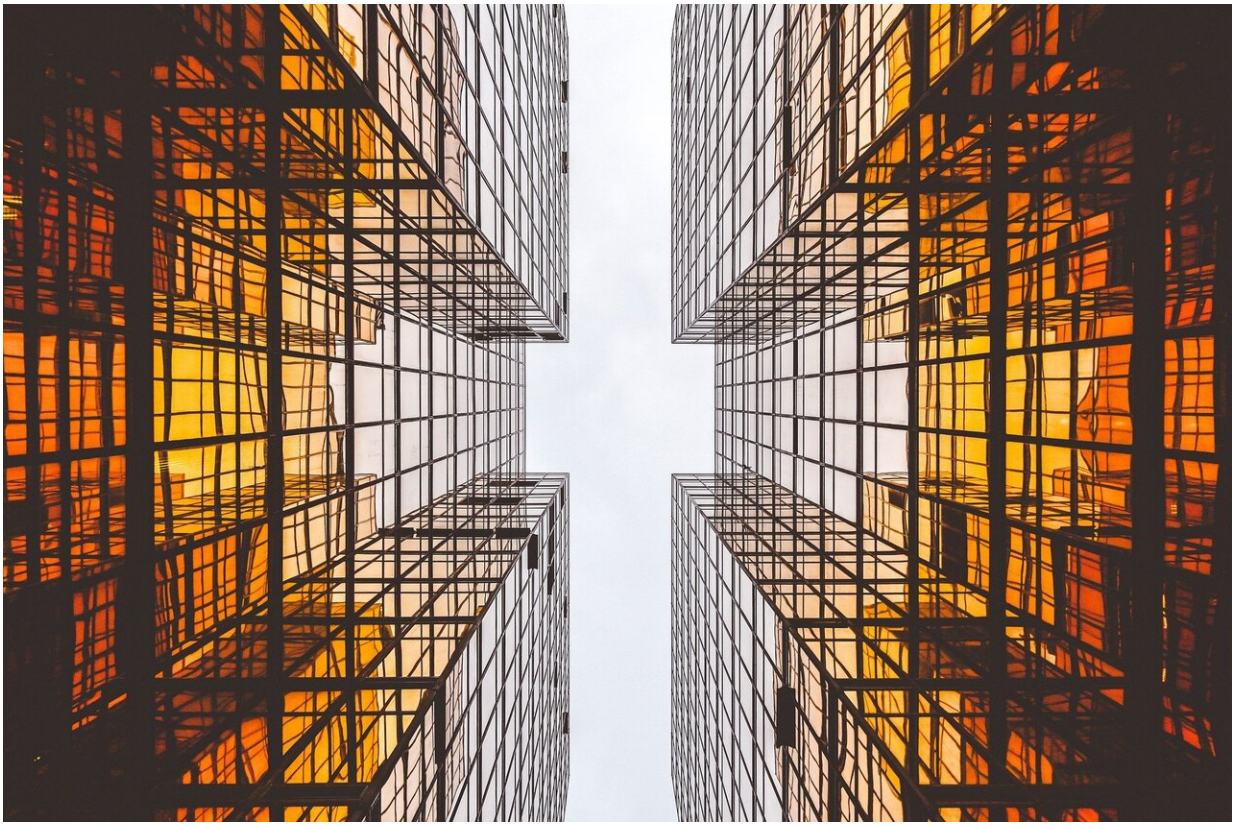

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Magnetic data storage has been gradually replaced by optical data storage (ODS) with higher efficiency, lower energy consumption, larger capacity, and longer service lifetime. As a classical kind of ODS

medium, photostimulated (PSL) materials with persistent luminescence have attracted researchers' interest because of their good erasable-rewritable ability and ultrafast writing speed.

In a study published in *Light: Science & Applications*, a research group led by Prof. WANG Yuansheng and Prof. LIN Hang from Fujian Institute of Research on the Structure of Matter (FJIRSM) of the Chinese Academy of Sciences and the collaborators developed a new kind of ODS medium, PSL transparent glass ceramic, via in situ precipitation of PSL $LiGa_5O_8$: Mn_2^+ nanocrystals (NCs, 2-7 nm) from a glass matrix.

The researchers found that the controlled thermally driven glass crystallization leads to a highly ordered nanostructure in the glass network, while the self-limited growth of $LiGa_5O_8$: Mn_2^+ NCs facilitates the generation of deep defects for PSL at a relatively low temperature due to low ionic diffusion mobility and, thus, the balance between nanosized grains and PSL performance is leveraged.

The highly ordered nanostructure enables light-matter interaction with high encoding/decoding resolution and low bit error rate.

Besides traditional two-dimensional optical storage, the high transparency of the studied bulk medium makes three-dimensional volumetric ODS possible, which brings about the merits of expanded storage capacity and improved information security.

This study brings a renaissance to classical PSL materials, and stimulates the development of new multi-dimensional ODS media.

More information: Shisheng Lin et al. High-security-level multi-dimensional optical storage medium: nanostructured glass embedded with $LiGa_5O_8$: Mn_2^+ with photostimulated luminescence, *Light: Science*

& Applications (2020). DOI: 10.1038/s41377-020-0258-3