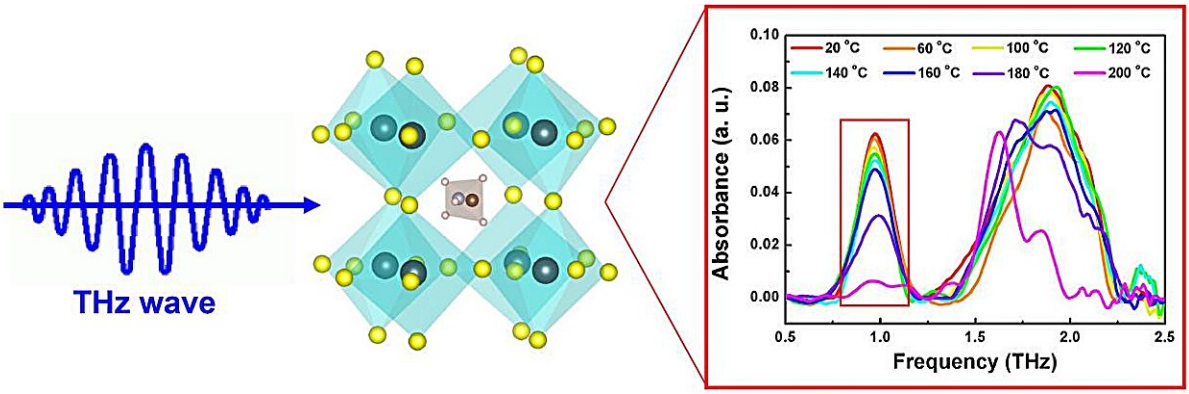
Terahertz detection: A novel approach to real-time monitoring of perovskite aging

August 23 2024



Terahertz detection: a novel approach to real-time monitoring of perovskite aging. Credit: Jinzhuo Xu, Yinghui Wu, Shuting Fan, Xudong Liu, Zhen Yin, Youpeng Yang, Renheng Wang, Zhengfang Qian, Yiwen Sun

Hybrid perovskites have great potential for use in advanced electronic devices like solar cells and LEDs. However, one major issue holding them back is that they don't last as long as needed for widespread commercial use. As these materials age, their performance drops, which is a big problem for both researchers and companies.

To tackle this issue, it's important not only to improve the stability of these perovskites but also to develop methods for detecting how they age in real-time. By understanding how these materials degrade over time, we can make them more durable and efficient.

In a study, researchers led by Prof. Yiwen Sun at Shenzhen University used the terahertz time-domain spectroscopy to observe the aging process of perovskites as it happens. This technique is based on the resonant absorption of terahertz waves by phonons in the perovskite.

The work titled "Real-time detection of aging status of methylammonium lead iodide perovskite thin films by using terahertz time-domain spectroscopy" was published in *Frontiers of Optoelectronics* on July 29, 2024.

As perovskites age, the intensity of phonon vibration modes associated with the Pb-I bonds decreases, leading to changes in the absorption peaks of terahertz waves at specific frequencies.

Therefore, they propose using the intensity of these terahertz absorption peaks as an indicator to measure the aging degree of perovskites. These findings are important because they offer a practical way to track the aging of perovskites in real-time.

This advancement could help bring perovskite-based devices to the market more quickly, making them more reliable and efficient for everyday use.

More information: Jinzhuo Xu et al, Real-time detection of aging status of methylammonium lead iodide perovskite thin films by using terahertz time-domain spectroscopy, *Frontiers of Optoelectronics* (2024). DOI: 10.1007/s12200-024-00128-0

Provided by Higher Education Press