基于钙钛矿纳米薄膜材料的损失模式共振器件

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损失模式共振 (LMR) 是近十余年来新兴的光学谐振，由于其具有高灵敏度、低损耗和宽波长调节范围等优势，因此在光学领域受到了广泛的研究和关注。钙钛矿材料是最前沿的半导体材料之一，不仅可以通过光生伏特效应将光能转化为电能，还具有载流子扩散长度长、激子结合能低、光吸收系数高、非辐射复合率低等独特性能，因此已在光伏、光电探测、光电显示、光催化等领域获得广泛应用。

西班牙纳瓦拉公立大学的 Ignacio R. Matías 教授的传感器研究小组与西班牙雷伊胡安卡洛斯大学 Beatriz Romero 教授领导的有机光电子器件研究团队合作，研究基于理论分析和实验制备，证明了钙钛矿纳米薄膜材料在制备 LMR 器件方面的广阔潜力。实验结果表明：当光线穿过表面涂敷有钙钛矿纳米薄膜的玻璃或硅材料时，会与钙钛矿纳米薄膜相互作用，从而产生损失模式共振；通过改变钙钛矿纳米薄膜的厚度，还可以基于不同波长的光产生不同数量的的损失模式共振，并在 TM 和 TE 模式下进行工作。

基于钙钛矿纳米薄膜材料的 LMR 传感器件具有高灵敏度、多功能性，以及高精度探测和高动态响应能力。该研究的理论和实验内容将为基于钙钛矿纳米材料的传感器、滤波器和调制器的制造提供坚实的基础。

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Generation of Lossy mode resonances (LMR) using perovskite nanofilms

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Perovskite, a material with extraordinary optical and electrical properties, has long been used in various technologies, from LED lights to solar cells. Scientists use perovskite to create 'lossy mode resonance' (LMR) devices. These devices act like super-sensitive detectors that can pick up even the slightest changes in their environment.

The Sensors research group of Prof. Ignacio R. Matías from the Public University of Navarra (Spain), in collaboration with the Organic Electronic and Photonic Devices research group of Prof. Beatriz Romero from Rey Juan Carlos University (Spain) have experimentally proposed, for the first time, the lossy mode resonance (LMR) devices based on perovskite coatings. The research conducted in this study holds significant importance within the broader landscape of scientific and technological advancements. It represents a step forward in the field of optical sensing, a domain that has the potential to impact various aspects of our lives, from environmental monitoring to industrial processes and even personal health.

The experimental results confirming the feasibility of perovskite-based LMR devices. Thus, the generation and emergence of multiple LMRs with varying thicknesses is unique as well as the possibility of working with both polarities, TM and TE. This is a substantial leap forward in the realm of optical sensing.

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