

Towards Metal-halide Based Perovskite Integrated Photonics

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Abstract

Metal-halide perovskites have emerged in recent years as a powerful material system in the field of photonics. Due to their promising electronic and optical properties, tremendous progress has been made in perovskites solar cell performance. This was followed by the demonstration of their great potential in the field of light emitting devices as well. However, the ability to pattern these materials remains a major challenge. Here, a complete lithographic scheme for thin perovskite films is demonstrated and utilized for the realization of micro lasers. The process is simple, fast, scalable, and exhibits sub-micron resolution. The optical properties of the perovskite films are obtained by characterizing distributed feedback laser fabricated from these films as well as by employing additional analytical tools. It is shown that the material properties are not impaired by the lithographic process. Using this approach, on chip, micro lasers are fabricated. Experimental characterization of these lasers shows that they exhibit low threshold levels and single-mode lasing. This process offers an important tool towards integrated perovskite photonics and is highly applicable also for the fields of photovoltaics, meta-surfaces, electronics and more

Short Biography

Jacob (Koby) Scheuer is a professor of Electrical Engineering and the head of department of Physical Electronics at the school of Electrical Engineering, Tel-Aviv University. He received the B.Sc. degree (summa cum laude) in electrical engineering and in physics, and the Ph.D. degree in electrical engineering from the Technion-Israel Institute of Technology, Haifa, Israel, in 1993 and 2001, respectively. He was a Chief Designer with Lambda crossing-an optical component startup specializing in microring resonators for two years. Then, he joined the Center for the Physics of Information and the Department of Applied Physics, the California Institute of Technology, Pasadena, as a Research Associate. In 2006 he joined the School of Electrical Engineering, Tel-Aviv University. His main fields of research involve metasurfaces, plasmonics, integrated optics and telecommunications. Prof. Scheuer is the author or co-author of more than 130 scientific paper in peer-review journal, 4 book chapters, more than 100 papers in conference proceeding, and 10 patent applications. He is a Fellow of the Optical Society of America and a fellow of the SPIE.

