Realization of Higher Order Topological Insulators in Hybrid Dielectric-Semiconductor Microcavities

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Since its introduction to the polariton community by El Daïf and co-workers in 2006 [1], the etch-and-overgrowth method has been a very versatile technique for the generation of photonic confinement. It is perfectly suited to manufacture large, uniform and complex potential landscapes since the confinement, as well as its coupling can be finely tuned by controlling the etch-depth [2].

Here, we improve on this method by using a dielectric top mirror consisting of SiO_2/TiO_2 layers instead of an epitaxially grown one [3]. We implement 0-dimensional higher order topological defects in a 2-D Su-Schrieffer-Heeger (SSH) lattice. Additionally, we show polariton lasing from the corner defect, as well as the effects of random gaussian disorder on the 0-dimensional corner mode [4].

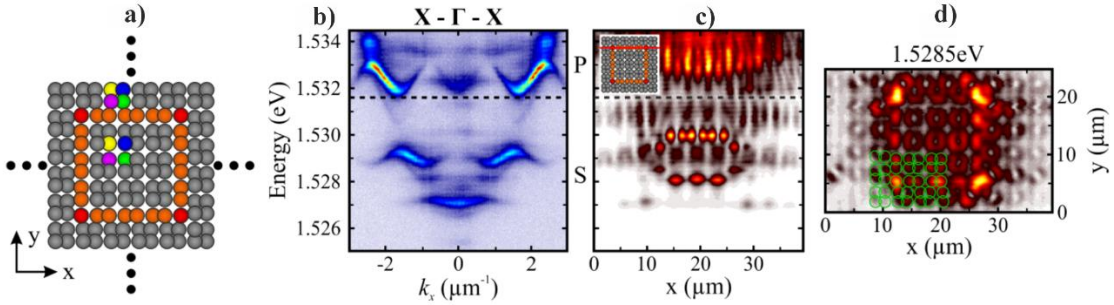

FIG. 1: a) shows the sketch of a 2-D SSH lattice with a compressed (outside) and stretched unit-cell (inside). b) and c) display the resulting reciprocal space and real space bandstructures, respectively, while d) shows the mode at the energy of the 0-D defects.

References

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