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Valley-Polarized Exciton-Polaritons in a Monolayer Semiconductor Embedded in a Microcavity[1] YEN-J. CHEN, TEODOR K. STANEV, NATHANIEL P. STERN, Department of Physics and Astronomy, Northwestern University, JEFFREY D. CAIN, VINAYAK P. DRAVID, Department of Materials Science and Engineering, Northwestern University — Two-dimensional transition metal dichalcogenides (TMDs) are semiconductors that exhibit degenerate, but inequivalent, valleys at their K-point band gaps which selectively couple to circularly-polarized light fields. Coherent hybrid states of light and matter, exciton-polaritons, have been observed when monolayer TMDs strongly interact with photon fields in a microcavity [2]. The degree of polarization is determined by the relative rates of exciton and intervalley relaxation, which can be modified for microcavity exciton-polaritons. Preservation of valley-polarization in a microcavity at room temperature is compared to the nearly zero polarization for bare monolayer MoS_2 on SiO_2, demonstrating cavity-modified relaxation dynamics of the coherent valley-specific exciton-polaritons. These results suggest promising opto-electronic applications for valley-based polaritonic and photonic devices integrating monolayer TMDs.

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[2]X. Liu, T. Galfsky, Z. Sun, F. Xia, E.-C. Lin, Y.-H. Lee, S. Kena-Cohen, and V. M. Menon. *Nature. Photon.* **9**, 30 (2015)

Yen-Jung Chen
Department of Physics and Astronomy, Northwestern University

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