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Spectral and polarization modulation of quantum dot emission in a one-dimensional liquid crystal photonic cavity[1] ANDREA L. RODARTE, C. GRAY, L.S. HIRST, S. GHOSH, University of California, Merced — We demonstrate spectral and polarization modulation of chemically synthesized core shell CdSe/ZnS quantum dots (QDs) embedded in a one-dimensional photonic cavity formed by a cholesteric liquid crystal (CLC) matrix. A Cano-wedge cell varies the pitch of the CLC leading to the formation of Grandjean steps. This spatially tunes the photonic stop band, changing the resonance condition and continuously altering both the emission wavelength and polarization state of the QD ensemble. Using high resolution spatially- and spectrally-resolved photoluminescence measurements we find that the emission is elliptically polarized and that the tilt of the ellipse, while dependent on the emission wavelength, additionally varies with distance across the Grandjean steps. This work opens up the possibility of designing new QD based optical devices, such as tunable single photon sources, where spatial control of wavelength and polarization of the embedded QDs would allow great flexibility and added functionalities.

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