

## 2D Materials for Color Recognition

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Color recognition is pivotal for identifying objects both by living beings and machines. Color-detectors enable automation in applications ranging from medical diagnostics and vehicular control to food-quality assessment and marine ecology monitoring. In this talk, I will describe a device (called the artificial eye or, A-Eye) that accurately recognizes and reproduces tested colors without any dispersive filtering. Instead, A-Eye uses multiple transmissive windows each with unique spectral features resulting from the broadband transmittance and excitonic peak-features of 2D transition metal dichalcogenides. Colored light passing through (and modified by) these windows and incident on a single photodetector generated different photocurrents, and these were used to create a reference database (training set) for 1337 “seen” and 0.55 million synthesized “unseen” colors. By “looking” at test colors modified by these windows, A-Eye can accurately recognize and reproduce “seen” colors with zero deviation from their original spectra and “unseen” colors with only ~1% median deviation, using the k-NN algorithm. A-Eye’s accurate color recognition dispels the notion that dispersion of colors is a prerequisite for color identification and paves the way for ultra-reliable color-recognition by machines with reduced engineering complexity.