# Organic retinomorphic sensor for motion detection

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**Abstract text for online and/or printed programs (50-150 words)**

Organic retinomorphic sensors are particularly effective for motion detection, offering the advantage of in-sensor processing that can remove repetitive static backgrounds. In this study, we investigate the important impact of high-k dielectrics in promoting charge accumulation to increase the intrinsic photo-response of photo-sensitive capacitors within this promising framework. We demonstrate a retinomorphic sensor array to detect the motion of a sample moving at different speeds and directions. These proof-of-concept results represent a promising advance toward scalable integration of organic retinomorphic arrays to meet the growing demand for more efficient motion tracking systems.

**Abstract text for technical review purposes (200-300 words)**

Organic retinomorphic sensors are particularly effective for motion detection, offering the advantage of in-sensor processing that can remove repetitive static backgrounds. Thin-film retinomorphic sensors with capacitor-resistor designs can be implemented at higher densities than previous silicon-based circuits and are suitable for low-power, high-speed identification of moving objects. The development of thin-film retinomorphic devices is in its infancy and many important aspects have not yet been explored. In this study, we demonstrate a novel approach to increase the photo detectivity (i.e., signal-to-noise ratio, SNR) of thin-film retinomorphic sensors by investigating the important impact of high-k insulating dielectrics in promoting charge accumulation to increase the intrinsic photo-response of photo-sensitive capacitors. The difference in the dielectric constant between high-k insulator and low-k bulk heterojunction semiconductor increases the voltage applied across the active photosensor layer, thereby improving the SNR of the retinomorphic sensor. Finally, we demonstrated a retinomorphic sensor array to detect the motion of a sample moving at different speeds and directions. These proof-of-concept results represent a promising advance toward scalable integration of organic retinomorphic arrays to meet the growing demand for more efficient motion tracking systems.

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