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(54) **ON-CHIP SPECTROMETER WITH TUNABLE PHOTODETECTION LAYER**

(71) Applicants: **Bar-Ilan University**, Ramat Gan (IL); **Yale University**, New Haven, CT (US)

(72) Inventors: **Doron NAVEH**, Petah-Tikva (IL); **Fengnian XIA**, Orange, CT (US); **Shaofan YUAN**, New Haven, CT (US)

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(57) **ABSTRACT**

Apparatuses and methods are provided for reconstructing a spectrum of an incident source. An example apparatus includes a photodetection layer, a voltage source, and a voltage drain. In some embodiments, the example apparatus further includes one or more gate electrodes. The photodetection layer includes one or more photodetection materials and is configured to generate a photoresponse vector in response to an incident source and/or gate electrodes. The voltage source and voltage drain are electrically connected to the photodetection layer and are configured to measure the photoresponse vector generated by the photodetection layer. The spectrum of the unknown incidence light can be reconstructed by using the photoresponse vector and the pre-measured response matrix.