CLAIMS

1. A photodetector array having a stacked film,

   the stacked film comprising

   a plurality of first electrodes formed on a substrate and extending in parallel in a first direction,

   a plurality of second electrodes extending in parallel in a second direction crossing the first electrodes,

   a first organic thin film diode and a second organic thin film diode disposed between each of the first electrodes and each of the second electrodes, and

   an intermediate connection electrode layer serving as a common anode or a common cathode, the intermediate connection electrode layer connecting the first organic thin film diode and the second organic thin film diode by backward-diode connection,

   wherein at least either the first electrodes or the second electrodes are transparent with light passing therethrough,

   the first organic thin film diode is a photoresponsive organic diode,

   the second organic thin film diode is an organic rectifier diode, and

   the intermediate connection electrode layer operates so that, with respect to the first organic thin film diode and the second organic thin film diode connected thereto, positive holes are transferred as the common anode and electrons are transferred as the common cathode.

2. The photodetector array of claim 1, wherein the first organic thin film diode is a heterojunction type and the second organic thin film diode is a single carrier type or Schottky type organic rectifier diode.

3. The photodetector array of claim 2, wherein the first organic thin film diode is a bulk heterojunction type photoresponsive organic diode.

4. The photodetector array of claim 1, wherein the first organic thin film diode and the second organic thin film diode have the same energy level for transporting carriers of electrons or holes transferred through the intermediate connection electrode layer are same.

5. The photodetector array of claim 3, wherein the organic semiconductor material constituting the first organic thin film diode and/or the second organic thin film diode is poly-3-hexylthiophene-2,5-diyl (P3HT) or a p-type semiconductor material having a sensitivity to light having a similar or different wavelength thereto.

6. The photodetector array of claim 4, wherein the first organic thin film diode and the second organic thin film diode are organic semiconductor materials transporting the carriers.

7. The photodetector array of claim 1, wherein the intermediate connection electrode layer is insoluble in a solvent used for forming the first or second organic thin film diode by coating means.

8. The photodetector array of claim 1, wherein the stacked film is formed through a plurality of photodetectors formed between the plurality of first electrodes and the plurality of second electrodes.

9. The photodetector array of claim 1, wherein the intermediate connection electrode layer consists of an organic conductive material or a metal oxide conductive material.

10. The photodetector array of claim 1, wherein the difference between an energy level of the highest occupied molecular orbital (HOMO) of an active layer of the first organic thin film diode and/or a semiconductor layer of the second organic thin film diode and an energy level of a work function of an intermediate connection electrode layer material is 0.5 eV or less.

11. The photodetector array of claim 1, wherein the substrate is a flexible substrate.

12. The photodetector array of claim 11, wherein the flexible substrate consists of polyethylene naphthalate (PEN), polyethylene terephthalate (PET), transparent polyimide (PI) or parylene (polyparaxylene).

13. The photodetector array of claim 1, wherein the photodetector array is formed by

applying an active layer of a first organic thin film diode to the plurality of first electrodes formed on the substrate;

applying the intermediate connection electrode layer on the active layer of the first organic thin film diode,

applying a semiconductor layer of the second organic thin film diode to the intermediate connection electrode layer; and

forming the plurality of second electrodes on the semiconductor layer of the second organic thin film diode.

14. The photodetector array of claim 1, wherein the difference between an energy level of the highest occupied molecular orbital (HOMO) of an active layer of the first organic thin film diode and/or a semiconductor layer of the second organic thin film diode and an energy level of a work function of an intermediate connection electrode layer material is 0.3 eV or less.