## CLAIMS

1. Electromagnetic radiation spectrum detection system (100), comprising:

a sensor device (20, 1) comprising two photodiodes in a "back-to-back" configuration and configured to convert an incident electromagnetic radiation (EMR) into electrical current as a function of a respective spectral responsivity dependent on an electrical adjusting voltage;

an electronic control and processing module (50) configured to:

- store a plurality of numerical calibration values representative of a responsivity matrix of the sensor device (1) and obtained by varying a photo-response of the sensor device (1) in a continuous manner by varying said electrical adjusting voltage;

- selectively provide the sensor device (1) with a plurality of electrical control voltage values ($V_B$) by varying in a continuous mode said spectral responsivity so as to obtain a corresponding plurality of detected electrical currents (Iph) associated with the incident electromagnetic radiation;

- process the values of said detected electric currents (Iph), obtained from the electrical adjusting voltage ($V_B$), and said plurality of numerical calibration values to obtain information (SP-ANS; IPST-IM) related to the incident electromagnetic radiation spectrum and determining power spectral density of the incident electromagnetic radiation for a plurality of optical wavelengths.

2. System (100) according to claim 1, in which the electronic control and processing module (50) is configured to select the wavelength of the

incident radiation detectable by the sensor device (1) according to said values of electrical adjuting voltage ($V_B$) which vary the responsivity of the sensor device (1).

3. System (100) according to claim 1, in which the electronic control and processing module (50) is configured tolinearly combining lines of said responsivity matrix to obtain a sintetic responsitity matrix to be processed to determine said power spectral density of the incident electromagnetic radiation on the sensor device (20, 1) .

4. System (100) according to claim 1, in which the control and processing module (50) includes:

a read-out module (2) configured to receive the plurality of detected electrical currents (Iph) and convert it to a plurality of detected electrical voltages (Vph);

a conditioning module (3) configured to receive the plurality of detected electrical voltages (Vph) and convert it into corresponding digital detected values (Vphi);

an analysis device (4) configured to receive the detected digital values (Vphi) and extrapolate the spectrum information (SP-ANS; IPST-IM) of the incident electromagnetic radiation.

5. System (100) according to at least one of the above claims, in which the spectrum detection system (100) is configured to perform spectral analysis (SP-ANS) of the electromagnetic radiation incident.

6. System (100) according to at least one of claims 1 to 5, where the system comprises a single sensor device (1).

7. System (100) according to at least one of Claims 1 to 5, in addition comprising a number of additional sensor devices (1) configured according to that sensor device (1) and arranged, together with that sensor device, according to a matrix of sensor devices identifying their pixels ;

wherein the electronic control and processing module (50) is also configured to:

- provide the array of sensor devices with an further plurality of electrical adjusting voltage values ($V_B$) by varying the spectral responsivity of each sensor device so as to obtain an further plurality of detected electrical currents (Iph) associated with the incident electromagnetic radiation;

- process further values of such further detected electric currents (Iph) based on the further values of adjusting electrical voltage ($V_B$) and said spectral responsivity of each sensor device, resulting in the acquisition of a hyperspectral image (IPST-IM) associated with such pixels.

8. System (100) according to at least one of the above claims where the sensor device (1) comprises a first photodiode (PD1) in one semiconductor material and a second photodiode (PD2) at least partially in another semiconductor material; the first and second diodes having their respective cathodes or anodes electrically connected each other.

9. System (100) according to at least one of the above claims, in which the first photodiode (PD1) comprises a substrate (5) in a first semiconductor material into which are integrated: a first layer (6) having a first type of doping, a second layer (8) having a second type of doping opposite to the first type of doping.

10. System (100) according to at least claim 10, in which the substrate (5) of the first photodiode (PD1) also includes an intrinsic layer (7) in the first semiconductor material.

11. System (100) claim 9 or 10, in which said second photodiode (PD2) includes said second layer (8) which is shared with the first photodiode (PD1); the second photodiode (PD2) also includes:

an integration layer (9) in a second semiconductor material overlapping said substrate (5) and in which is integrated: an intrinsic layer (10) and a first doped layer (11) having a doping opposite to the doping of said second layer (8) included in the substrate (5).

12. System (100) according to at least one of the above claims, in which: the first and/or second photodiode (PD1, PD2) is made of semiconductor materials chosen from one of the following types:

(a) semiconductors III-V and their alloys;

(b) semiconductors II-VI and their alloys;

(c) semiconductors of group IV and their alloys.

13. System (100) according to claim 8, in which this sensor device (1) includes:

a substrate (5) in a first semiconductor material so as to define a first face (12, 30) exposed to electromagnetic radiation (EMR) and a second face (32) opposite the first face;

a first doped region (31) included in said substrate (5) so as to extend to said second face (32) and having a first type of doping;

a second doped region (33) included in said substrate so as to extend to the second face (32), separated from the first region (31) by a portion of the substrate (5), having a second type of dopant;

a layer in a second semiconductor material (34) placed on the second face (32) in contact with the first doped region (31) and such as to define a third face (35) opposite the second face (32);

a doped layer in the second semiconductor material (36) having the second type of doping and overlapping the third face (35);

metal contacts arranged so as to contact the second doped region (33) at the second face and the doped layer (36), where :

the first doped region (31), the portion of the substrate (5) and the second doped region (33) are part of the first photodiode (PD1) of the sensor device (1),

the first doped region (31), the layer in the second semiconductor material (34) and the doped layer in the second semiconductor material (36) are part of the second photodiode (PD2) of the sensor device (1).

14. System (100) according to claim 8, in which the control and processing module (50) is integrated into the silicon substrate (5) in which the first photodiode (PD1) is integrated.

15. Sensor device (10) according to claim 8, in which the first and second semiconductor materials are selected so that the sensor device (1) is such that it operates in the visible, near-infrared to part of the short-wave infrared.