illumination. In other words, electronic components can be attached to a back surface, side surface, or front surface of the photovoltaic module so long as the electronics are not attached on an active area of the photovoltaic module. The entire device (photovoltaic module plus electronics device) is packaged/laminated/encapsulated together, producing a thin, potentially completely self-contained device.

[0007] In some embodiments, the device is formed by attaching a flexible electronic device onto a flexible photovoltaic module. For example, the device could be a photovoltaic-powered sensor, or a label. The devices can sense and transmit data wirelessly with an onboard radio. The onboard photovoltaic can increase the available energy and/or extend the lifetime of the device over other solutions, such as but not limited to using the energy storage units. This, for example, promotes more frequent or constant communication, and/or ability to power more electronics that use more energy.

[0008] According to a first aspect of the present invention, there is provided a photovoltaic powered flexible electronic device comprising a flexible photovoltaic module, a cathode electrode and a anode electrode incorporated into the flexible photovoltaic module, wherein the cathode electrode and the anode electrode are at least partially exposed, and a flexible circuit board, wherein the flexible circuit board is attached to one of the following: (a) the flexible photovoltaic module, (b) a flexible substrate located on the flexible photovoltaic module, and (c) an adhesive located on the flexible photovoltaic module, the flexible circuit board comprising: a recharging circuit comprising a power management device, wherein the recharging circuit is electrically connected to the cathode electrode and anode electrode; an energy storage unit; and a radio emitting device, wherein the photovoltaic powered flexible electronic device comprises a Young’s Modulus of 150 GPa or less.

photovoltaic module, a cathode and an anode electrodes incorporated into the flexible organic photovoltaic module, wherein the cathode and the anode electrodes are at least partially exposed, and a flexible circuit board, wherein the flexible circuit board is attached to one of the following: (a) the flexible organic photovoltaic module, (b) a flexible substrate located on the flexible organic photovoltaic module, and (c) an adhesive located on the flexible organic photovoltaic module, the flexible circuit board comprising: a recharging circuit, wherein the recharging circuit is electrically connected to the cathode and anode electrodes; an energy storage unit; and a radio emitting device, wherein the organic photovoltaic powered flexible electronic device comprises a minimum bend radius ranging from 1 mm to 100 mm.

[0012] According to a second aspect of the present invention, there is provided a photovoltaic powered flexible electronic device comprising a flexible photovoltaic module; a cathode electrode and a anode electrode incorporated into the flexible photovoltaic module, wherein the cathode electrode and the anode electrode are at least partially exposed; and a flexible circuit board, wherein the flexible circuit board is attached to one of the following: (a) the flexible photovoltaic module, (b) a flexible substrate located on the flexible photovoltaic module, and (c) an adhesive located on the flexible photovoltaic module, the flexible circuit board comprising: a recharging circuit comprising a power management device, wherein the recharging circuit is electrically connected to the cathode electrode and anode electrode; an energy storage unit; and a power supply connector, wherein the photovoltaic powered flexible electronic device comprises a Young’s Modulus of 150 GPa or less.

[0013] In certain embodiments, the present disclosure is directed to a photovoltaic powered flexible electronic device comprising a flexible photovoltaic module; a cathode and an anode electrodes incorporated into the flexible