shadow masks with sufficient overlay accuracy, the necessary components of the energy structure **2320** are deposited using PVD or CVD as described above. A final passivation coating (such as **2331** of **FIG. 23**) is applied to the energy stack. The IC in wafer form with energy source integrated is sent for test, dicing and packaging. This provides integration of electronics and solid-state rechargeable batteries by cofabrication.

Design and Fabrication of Solid-State Power Sources Fabricated as a Laminate on the Packaging for the Device the Energy Source Will Power

[**0267**] Solid-state processes are used to cofabricate electronics and packaging. This is possible by using the low-temperature processes for solid-state batteries described above.

[**0268**] FIGS. **25**B-**25**E show a fabrication sequence for cofabrication of solid-state integrated circuits and solid-state energy source such as that described above, but onto a packaged IC **2540**. **FIG. 25B** shows a plan view and **FIG. 25C** shows an elevational view of IC **2540**. In some embodiments, IC **2540** includes a silicon chip **2545** having integrated components such as transistors, resistors, memory, etc., a lower substrate **2540**, and a wiring superstrate **2544** having deposited wires **2540** that extend to bonding vias **2542**. **FIG. 25D** shows a plan view and **FIG. 25E** shows an elevational view of an integrated battery-IC **2501**. Battery-IC **2501** includes a cathode **2326** (e.g., lithium cobalt oxide), electrolyte layer **2327** (e.g., LiPON), and anode layer **2328** (e.g., including copper, carbon, lithium, lithium-magnesium, and/or other suitable anode material). Passivation overcoat layer **2329** suitable to protect the inner components of battery **2320** is then deposited or grown.

[**0269**] In one embodiment, the product package **2540** is formed by conventional means. All machine work and cleaning is accomplished. The package **2540** is sent to energy processing for deposition of battery **2320** or other energy-storage device. The design of the package included a suitable area **2549** for deposition of battery components. Using shadow masks with sufficient overlay accuracy, the necessary components of the energy structure (e.g., a battery and/or photovoltaic cell) are deposited using the methods described above. A final passivation coating **2329** is applied to the energy stack structure. The package with energy structure integrated is sent for assembly.

[**0270**] In one embodiment, further electronics are attached to the package/energy entity **2501** by way of adhesive. The electronics are then hardwired to the package/energy entity. In a second embodiment, the electronics are mounted directly to the package/energy entity by **2501** way of solder bumps. In some embodiments, the entire assembly is optionally potted, then sealed by the package cover. In other embodiments, the battery is formed on a substrate suitable as a packaging material. The substrate is formed into individual package form factors. The package with energy structure integrated is sent for assembly.

[**0271**] Thus, the present invention provides integrated product packaging and solid-state rechargeable batteries by cofabrication where the battery is deposited on the already-formed package. The present invention also provides integrated product packaging and solid-state rechargeable batteries by cofabrication where the battery is deposited on a suitable package material, then formed into the package.

[**0272**] The present invention also provides a method of attaching electronics to a package/energy hybrid wherein the electronics are mounted with adhesive, then hardwired to the energy source. The present invention further provides a method of attaching electronics to a package/energy hybrid wherein the electronics are attached to the energy source via solder bumps.

[**0273**] **FIG. 25F** shows a block diagram of a layer-deposition system **2560** much the same as that of **FIG. 24**B, however rather than using a sheet of polymer or other homogenous substrate material **2410**, system **2560** starts with a sheet **2561** having a plurality of processed circuits **2540**.

[**0274**] **FIG. 25G** shows a perspective view of a processed sheet **2569**. Sheet **2569** includes a plurality of preprocessed circuits **2540** each having a battery **2320** deposited on it by system **2560**. Sheet **2569** is then cut or diced into individual devices **2501**.

[**0275**] **FIG. 26A** shows a perspective view of an device **2600** of the present invention having an integrated circuit **2510** overlaid on its back with a battery **2320**. This embodiment is similar to that of **FIG. 25**A, except that the battery **2320** is deposited on the back of IC **2510**, and is wire-lead bonded to contact **2514** using wire **2614** and to contact **2515** using wire **2615**.

[**0276**] In some embodiments, device **2600** further includes device **2650** such as a photovoltaic cell fabricated on a surface of integrated circuit **2510**, for example, on the opposite side as that facing battery **2320**. In some embodiments, such a photovoltaic cell **2650** provides power to IC **2510** for both operation of IC **2510** and for charging of battery **2320** during periods of relatively bright light, and then battery **2320** provides power to IC **2510** for operation during periods of relatively dim or no light. In some embodiments, device **2600** includes one or more devices **2650** such as sound transducers for such applications as a hearing aid having an combined transducer-battery-amplifier device. In some such embodiments, both a photovoltaic cell **2650** and one or more sound transducers **2650** are deposited in order to provide a light-rechargeable hearing aid which could be taken out of the ear at night and placed in a light-emitting recharging stand (e.g., that of **FIG. 27L**), avoiding the need to replace batteries or even to electrically connect to an external recharging circuit. In some embodiments, a photovoltaic cell and/or a sound transducer is/are deposited on one face of device **2600** for recharging and for sound pickup, and a sound transducer is deposited on an opposing face for use as s speaker for applications such as a hearing aid.

[**0277**] In yet other embodiments, **2600** further includes device **2650** such as a magnetoresistive sensor fabricated on a surface of integrated circuit **2510**, for example, on the opposite side as that facing battery **2320**. Such a device **2600** could be used in a compass, for example.

[**0278**] In some embodiments, embodiment **2600** further includes an antenna or electromagnetic radiation receiving loop **2660** fabricated on a surface of integrated circuit **2510**, for example, on the opposite side as that facing battery **2320**. In some such embodiments, device **2600** also includes one or more devices **2650** such as sound transducers for such