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SENSORS FOR BATTERY SAFETY APPLICATIONS

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In the contemporary world, a lot of attention is drawn to achieving the goals of zero emissions and in the transition to a carbon-free society and a more circular economy through the use of electrical batteries [1]. Thus, the field of electric batteries based on Li-ion, Li-S or solid state is intensively investigated by researchers to improve the performance in terms of energy and power densities, but also an insurance for both producers and consumers [2]. Permanent monitoring of the safety of batteries is crucial because various defects or reactions that can occur in the cell(s) of a battery can lead to serious safety risks, such as fires and explosions, due to the enormous heat generated in the electrolyte, which leads to the release of toxic and flammable gases and namely in the so-called thermal runaway [2]. The results presented here are the development of sensors based on layered semiconducting metal oxides reliable to detect early the electrolyte components typical of batteries, which can appear during their failure, such as 1,3-dioxololane, 1,2-dimethoxyethane, ethylene carbonate, dimethylcarbonate, lithium bis(trifluoromethanesulfonyl)imide, lithium nitrate and lithium hexafluorophosphate [1-4].

The devices obtained demonstrate the possibility of using them as 2 in 1 sensors, thus working as a temperature sensor at low operating temperatures and as a gas sensor at temperatures above 200 ^{o}C [1]. In the same way, schematic concepts were proposed for the location of the sensors obtained in the battery pack for an early warning of battery thermal runaway [1,2].

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