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(54) **THREE-DIMENSIONAL BATTERIES WITH COMPRESSIBLE CATHODES**

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(57) **ABSTRACT**

A secondary battery for cycling between a charged and a discharged state is provided. The secondary battery has an electrode assembly having a population of anode structures, a population of cathode structures, and an electrically insulating microporous separator material. The electrode assembly also has a set of electrode constraints that at least partially restrains growth of the electrode assembly. Members of the anode structure population have a first cross-sectional area, A_1 when the secondary battery is in the charged state and a second cross-sectional area, A_2, when the secondary battery is in the discharged state, and members of the cathode structure population have a first cross-sectional area, C_1 when the secondary battery is in the charged state and a second cross-sectional area, C_2, when the secondary battery is in the discharged state, where A_1 is greater than A_2, and C_1 is less than C_2.