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(54) **FIRE AND CORROSION RESISTANT THERMALLY STABLE ELECTRODES AND BATTERIES AND METHOD FOR MANUFACTURING SAME**

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(52) **U.S. Cl.** **429/245**; 429/162; 429/185

(58) **Field of Classification Search** 429/245, 429/162, 215, 185

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,051,325 A * 9/1991 Shishikura et al. 429/341
5,187,033 A 2/1993 Koshiha
5,262,254 A 11/1993 Koksbang et al.

5,376,478 A 12/1994 Nakacho et al.
5,464,706 A * 11/1995 Dasgupta et al. 429/218.1
5,498,489 A 3/1996 Dasgupta et al.
5,547,782 A 8/1996 Dasgupta et al.
5,714,277 A 2/1998 Kawakami
5,763,103 A 6/1998 McCullough
5,830,600 A 11/1998 Narang
5,843,592 A 12/1998 Barker et al.
5,961,672 A 10/1999 Skotheim et al.
6,022,641 A * 2/2000 Endo et al. 429/232
6,040,091 A 3/2000 Sugita et al.
6,168,885 B1 1/2001 Narang et al.
6,194,098 B1 2/2001 Ying et al.

* cited by examiner

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(57) **ABSTRACT**

An improved battery cell current collectors which are formed as a unitary structure with mating electrodes attached on one surface. The current collectors are formed of non-metallic material including particle-dispersed plastic tape, plastic dispersed carbon tape, fiber dispersed conductive plastic and carbon tape, or particle and metallic powder dispersed conductive tape to resist corrosion. The need to charge the battery immediately after manufacture is eliminated by the improved battery cell design. Additional utility is provided by fire retardant being mixed with one or both of the electrode composite forming the current collectors and the layer forming the current collectors and by the biasing of the current collectors against their terminating contacts by the compressed current collector material communicating a bias of the current collectors against the internal surface of the battery container thereby increasing current flow and decreasing corrosion.

18 Claims, 3 Drawing Sheets

