Scalable Novel Lanthanide-ligand Complex for Robust Flexible Micro-supercapacitors

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Abstract:

Herein we report on the excellent supercapacitor performance and flexible device application of a robust, new polymeric metal-ligand complex, which is readily synthesized at room temperature via a straightforward, one-step protocol using the N4 donor, namely 3,3'-diaminobenzidine (DAB) and gadolinium (III) nitrate. Thus, the coordination polymer (Gd-DAB) complex synthesized in a facile and economically feasible synthesis route paves the way for realizing a new class of affordable, durable energy devices for storage applications. The results of complementary characterization techniques not only corroborated the proposed structure but also revealed a potential two-dimensional (2D)/sheet-like organization similar to the coordination polymer (COP). The electrochemical tests performed on the as-prepared sample, in the form of an electrode active component, showed brilliant supercapacitive characteristics with capacitive retention exceeding over 100 % even after 5000 cycles. The complex has been used as an active media for the fabrication of an interdigitated flexible and symmetric supercapacitor. The electrochemical storage device evaluation, under different bending angles (up to 180°) and twisting conditions at the current density of 10 μA/cm2 for 5000 cycles, revealed the capacitive retention of ~ 50 % after 5000 cycles.

References

[1] Sabiar Rahaman, Madhu Babu Kanakala, Manmohansingh Waldiya, Aditya Sadhanala, Channabasaveshwar V. Yelamaggad, Kavita Pandey, Journal of Power Sources, Volume 564, 2023, 232801.

Figures

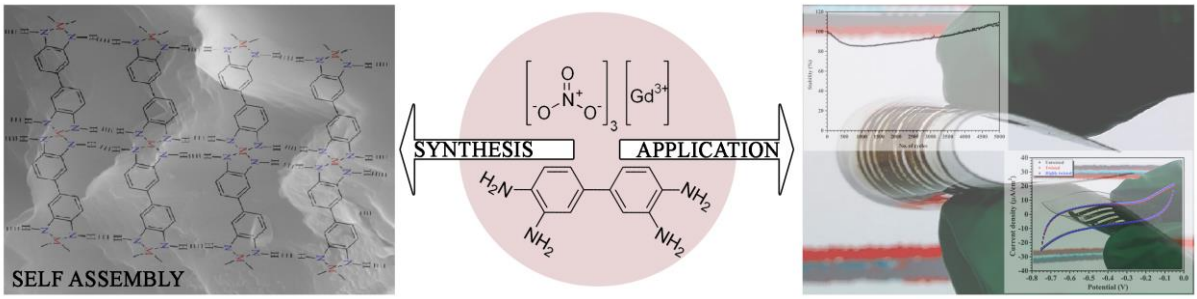

Figure 1: Graphical representation of novel lanthanide-ligand complex synthesis and iapplication for robust flexible micro-supercapacitors.