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Design of Pulsed Power Supply for Repetitive Pulsed High Magnetic Field for Water Electrolysis

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A system based on a novel scheme for generating the repetitive pulsed high magnetic field (RPHMF) is developed and applied to enhance the performance of NdFeB electrocatalyst in alkaline water electrolysis for the first time. In this system, the scheme for generating continuously high-frequency pulses depends on the cooperation of multiple power modules with new structure. Multiple power modules are connected in parallel to energize the pulsed magnet, and each module is composed of two capacitor banks and a pulse transformer, which is used to realize the conversion of the energy between the two capacitor banks. As the residual energy in one capacitor is transferred to another, the energy required to be replenished for the next pulse reduces substantially. Then the high repetition rate of the RPHMF can be achieved by discharging the capacitor banks of each module in sequence. The scheme has been validated by the experiment of a 2.4 T/12 Hz prototype with only one power module. Simulation shows that the frequency of the RPHMF can be improved to 12^*N Hz with N power modules and a higher repetition rate of the RPHMF may bring new opportunities to the water electrolysis.

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