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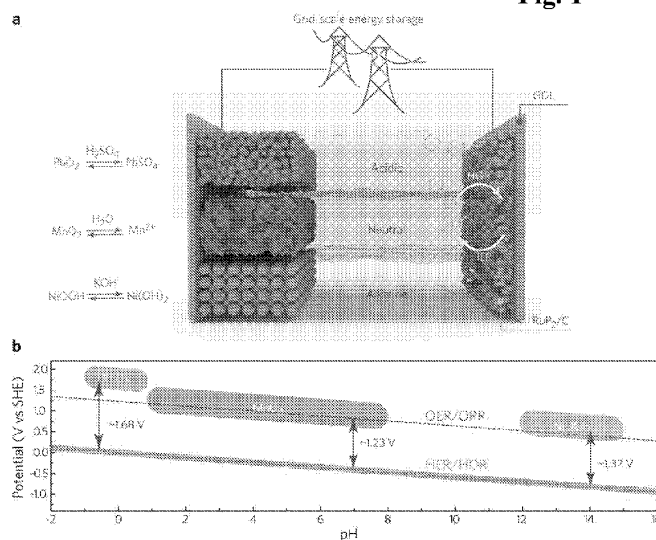
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(54) Title: PH-UNIVERSAL AQUEOUS RECHARGEABLE HYDROGEN BATTERIES

Fig. 1



(57) **Abstract:** Described are aqueous rechargeable hydrogen batteries operating in the full pH range (e.g., pH: -1 to 15) with potential for electrical grid storage. The pH-universal hydrogen batteries operate with different redox chemistry on the cathodes and reversible hydrogen evolution/oxidation reactions (HER/HOR) on the anode. The reactions can be catalyzed by a highly active ruthenium-based electrocatalyst. The ruthenium-based catalysts exhibit comparable specific activity and superior long-term stability of HER/HOR to that of state-of-the-art Pt/C electrocatalyst in the full pH range. New chemistries for aqueous rechargeable hydrogen batteries are also provided.

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