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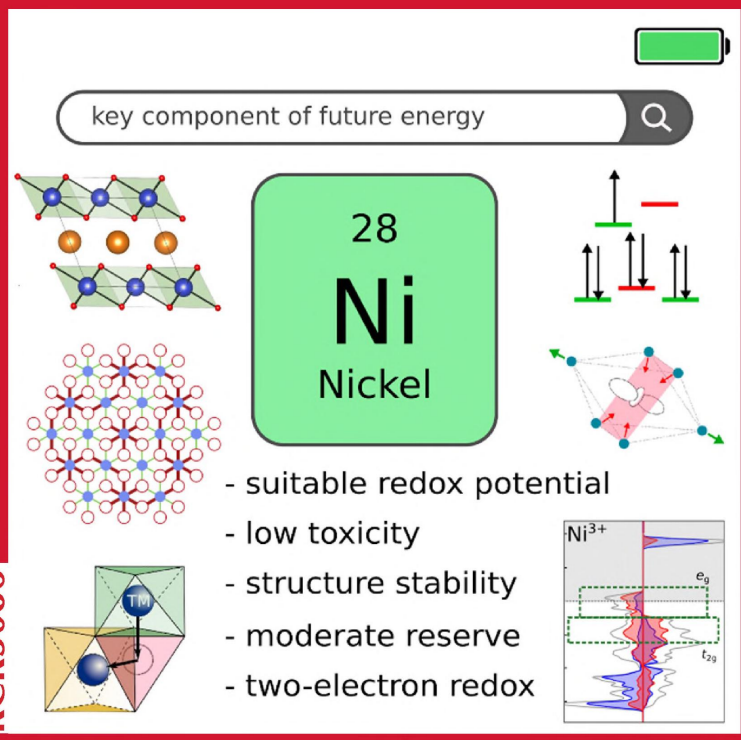

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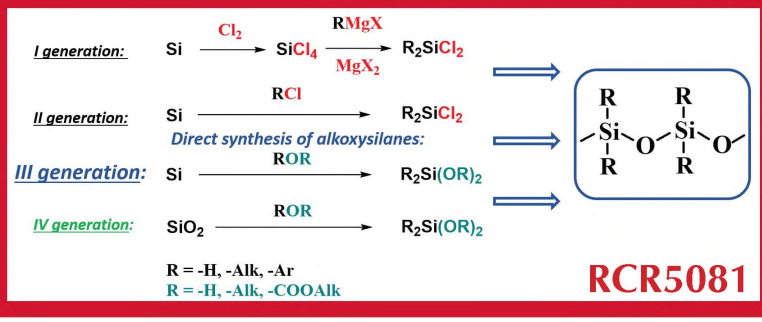

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Nickel is a key element in the future energy

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The review discusses the complex properties of nickel and its role as a critical element for ensuring a confident transition to a new technological paradigm from fossil fuels in favor of using advanced electrochemical storage and energy conversion systems. The main classes of nickel-containing materials of the positive electrode (cathode) for metal-ion batteries are addressed, the place of nickel among other 3*d*-metals used in the industry of electrochemical energy storage is determined. The main methods and approaches to the synthesis of state-of-the-art and next generation cathode materials based on layered Ni-containing oxides are presented. The crystal and electronic structures of these materials, including their evolution in the process of (de)intercalation of alkali metal cations, are considered in the context of their electrochemical properties. The most acute problems facing modern materials science on the way to commercialization and industrial production of new generation high-energy density cathode materials are determined. At the end of the review, promising directions for the further development of nickel-containing cathode materials are outlined.
Bibliography — 252 references.