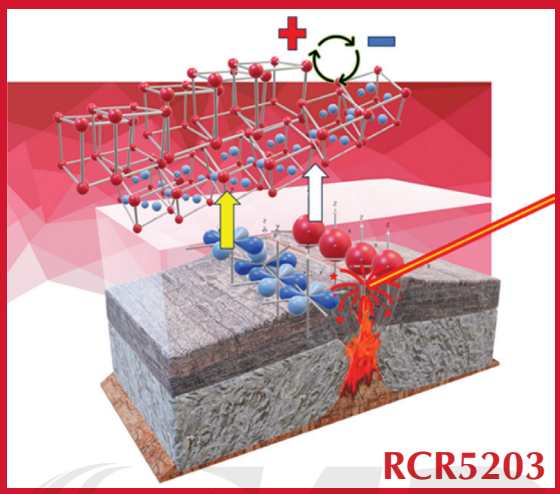
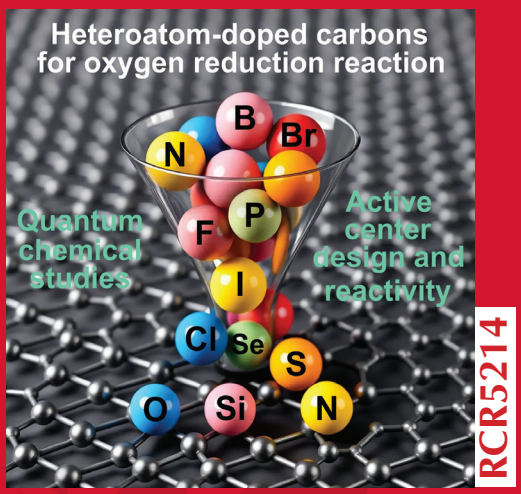
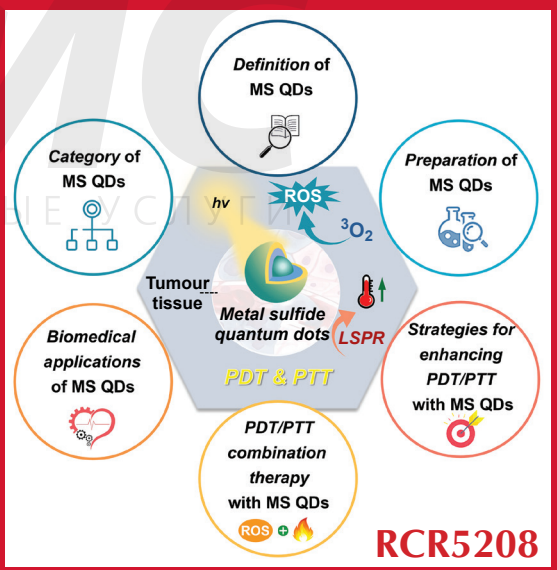
Russian Chemical Reviews

Успехи химии







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frequently rendered more complex by the presence of brominated flame retardants and synergists and therefore the elevated levels of nitrogen and bromine compounds present in the products. The review methodically analyzes the chemical recycling of polyacrylonitrile and its copolymers, including hydrolysis, hydrothermal recycling, gasification, and pyrolysis. The primary focus of this study is on brominated waste, which poses significant challenges in terms of reuse without undergoing chemical recycling. In contrast to previous review publications, the present study provides comprehensive analysis of the hydrocarbon composition of polymer conversion products and the content of nitrogen- and bromine-containing organic compounds. The potential for the further refining of pyrolysis products to yield not only fuels but also high value-added products, such as monomers, is considered separately. The potential of methods for preliminary preparation of polymer waste for recycling including hydrolysis and hydrothermal treatment, which have not received sufficient attention previously, is demonstrated.
Bibliography — 182 references.

Modern views on the mechanism of oxygen reduction reaction on metal-free heteroatom-doped carbon nanostructures. Quantum chemical approach

RCR5214

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This review summarizes the modern views on the mechanism, active site structure, and thermodynamics of the electrochemical oxygen reduction reaction catalyzed by heteroatom-doped carbon nanostructures for the subsequent rational design of catalytic sites and development of promising metal-free cathode materials for fuel cells for next-generation energy systems. The effect of both classic (B, N, S, P, O, Hal) and advanced 'hybrid' (Si, Se) dopants in various states and in two- or threecomponent forms on the activity modulation of oxygen adsorption sites and on the reaction mechanism is considered. Particular attention is paid to the evolution of the views on the role of silicon, which switched from considering silicon to be inert due to its high oxophilicity to the discovery of unique catalytic properties of silicon in SiN_x type catalytic sites. The conclusions made in the review open up new opportunities for the targeted design of hierarchical materials with adjustable properties *via* precise control of the composition and structure of heteroatom defects.
Bibliography — 252 references.