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Opinion Article

Renewable Sources of Zeolitic Pores for Organometallic Compounds

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DESCRIPTION

Zeolites are hydrated, crystalline micro porous aluminosilicates, whose structures enclose channels and/or cavities of molecular dimensions. They are present in our everyday life, being widely employed as sorbents, as ion exchangers in detergents, or as catalysts in industrial processes, and as diverse as oil refining or petrochemistry and chemicals and fine chemicals.

Zeolites include:

i. Discovery of new zeolitic materials,
ii. Continuous use in petroleum refining,
iii. Using in the preparation of organic chemical intermediates or end-products,
iv. Use in sustainable processes to produce bio-compounds and green fuels.

In Transition metal the zeolite composites are versatile catalytic materials for a wide range of industrial and lab-scale processes. The Significant advances in fabrication and characterization are well-defined in metal centers confined is zeolite matrixes. The synthesis of transition metal moieties inside the zeolite pores is organometallic purification which approaches recrystallization, extraction, or distillation which are not applicable. It is possible to exploit the shape selectivity and specific metal–zeolite interaction to prepare well-defined and high effective catalysts.

Hydrogen is the most abundant element and naturally bonded with other elements and can be extracted from water, biomass, or hydrocarbons. Zeolites for hydrogen production involves in two important approaches are: to produce hydrogen from renewable sources and reduce the CO_2 emissions. By applying reforming methods to biomass-derived compounds, for example, bioethanol, because biomass consumes atmospheric Carbon Dioxide (CO_2) during growth, it can have a small net CO_2 impact compared with fossil fuels.

The second process is by production of hydrogen by using water splitting and solar energy. The hydrogen production by water splitting corresponds to those methods including outside the C-cycle. This process is very attractive due to the potential use of solar energy which is very abundant.

The use of catalysts in order to improve the production of hydrogen by reforming of bioethanol and water splitting takes place. Among them, zeolites have future catalysts support. The influence of zeolites that supports to prepare ethanol reforming catalysts with high activity, selectivity, and stability. The properties of zeolite membrane depend on the preparation method but are not suitable for hydrogen separation. The formation of composite materials or adjustment in synthesis technique are mentioned that are most attractive type of zeolite composites is the Mixed Membrane Matrix (MMM) and Metal Organic Frameworks(MOF).

Among the different energy carriers, hydrogen from photo catalytic water splitting is considered as one of the most promised carriers, since it allows storing solar energy in the form of chemical energy. To make use of this energy by human technology, the solar energy must be captured, converted, and stored in order to assure a continuous supply of energy.

Splitting of water takes place, when the semiconductor is irradiated with the presence of light in an electron donor and acceptor. In the photo catalytic water splitting, the hydrogen is produced from the water by using sun light and specialized semiconductors.

Natural zeolites in wastewater treatment are one of the oldest and the most perspective areas of their application. The presence of heavy metals (Zn, Cr, Pb, Cd, Cu, Mn, Fe, etc.) in wastewater is a serious environmental problem and their removal by natural zeolites has been extensively studied along with other technologies. Recent investigations of natural zeolites as adsorbents in water and wastewater treatment, their properties and possible modification of natural zeolites have been studied. Various natural zeolites around the world show good ion-exchange capacities for cations, such as ammonium and heavy metal ions. The modification of natural zeolites can be performed by several methods, such as acid treatment, ion exchange, and surfactant functionalization. The modified

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zeolites can show high adsorption capacity also for organic matter and anions.

CONCLUSION

They support the catalysts which contains some physio-chemical properties that challenges to produce hydrogen from renewables and probably the major one is developing new catalytic process to produce sustainable hydrogen and reducing the cost to be competitive with the current fuels. New scientific applications have been developed for these materials among them; the production of green fuels from renewable sources is the large part of the research efforts.

The intense exploitation of fossil fuels is to satisfy the globally growing energy demand has caused an increase of CO_2 in the atmosphere and, therefore, a significant global warming (green-house effect). Furthermore, the reserves of fossil fuels on earth are finite and no matter how long they will last, and renewable energy which is alternative independent of fossil fuels has to be developed for the future.