Synthesis of Mesoporous Molybdenum Carbide-Carbon Composite using Molecular-scale Interaction as an Efficient Electrocatalysts for the Hydrogen Evolution

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Hydrogen is regarded as green future fuel. However, to generate the hydrogen, the noble metal catalysts must be necessary. Due to its high price and scarcity, the substitution for noble metal is required. Molybdenum carbide (Mo_xC) attracts attention as a substitution for noble metal due to its high activity and stability. However, the Mo_xC catalysts has insufficient activity as a substitution. For the better efficiency, the catalysts should have more active sites and proper hydrogen bonding. By introducing the mesoporous structure, the number of active sites can be enhanced due to the increase of the surface area. In addition, by synthesizing Mo_xC using solid-state reaction with carbon, the hydrogen bonding can be controlled. For this purpose, we synthesize the mesoporous Mo_xC -carbon composite using EISA method. The block copolymer PEO-b-PS is used as a structure directing agent for resol (carbon source), TEOS and Phosphomolybdic acid (PMA). Since the interaction between PMA and structure directing agent is weak, we introduce melamine resol to enhance the interaction. By introducing the melamine resol, we can get more enhanced mesoporous structure by improving the interaction.