

Carbon Growth During Catalytic Decomposition of Methane over Carbon Black

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It has recently been reported that carbon black (CB) shows almost constant catalytic activity in methane decomposition even though the surface area decreases considerably. In this work, the morphology of carbon deposited on a domestic carbon black was investigated by SEM and HRTEM. SEM showed that the primary particles of the fresh carbon black were round and loosely stuck together; their size ranged from ca. 30 to 70 nm. As the carbon deposited by methane decomposition, many protrusions were developed on the particle surface, the particle size increased and the particles got stuck together firmly. When the amount of deposited carbon was more than about 8 g/g CB, many protruding bent ridges were formed and the particle size was 150–200 nm. HRTEM showed that protruding small cones were formed on the particle surface in the early stage of the carbon deposition. As the deposited carbon increased, the protrusions grew in a wide variety of forms and more new protrusions were formed. The protrusions also consisted of graphene layers, and a great part of them was arranged in parallel. It may be suggested that the active sites are defects or a particular structure in the graphene crystallites such as edges and their number may remain nearly constant.