Development of Nanostrucutred Carbon Materials and Application toward Electrocatalysts

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With the aim of developing fuel cells for next generation energy technologies, it is necessary to overcome two major problems, cost and durability. In this research, we challenge those problems thought the fundamental development and study of electrode materials in nanometer-scale. To date, we have made carbon materials with ordered 8-nm nano-channels and treated that nano-space as a reaction site (Figure 1).[1-3] After introduction of catalysts into such nano-space, and resulting materials were applied to the electrode catalysts for fuel cell reactions. In comparison to larger nano-space (over 30 nm), the different phenomena were observed. Both proton and hydrogen/oxygen were effectively provided, and further successful drain of water through the pores was achieved. Due to all these combined conditions, the promotion of electrocatalytic reactions has been accomplished. Besides Pt, more recently, we have successfully synthesized 2-3 nm of Pt/Cu alloy particles which fit into 8 nm nanospace. We have effectively dealloyed PtCu3 within the nanochannels and improved mass activity toward oxygen reduction reactions.

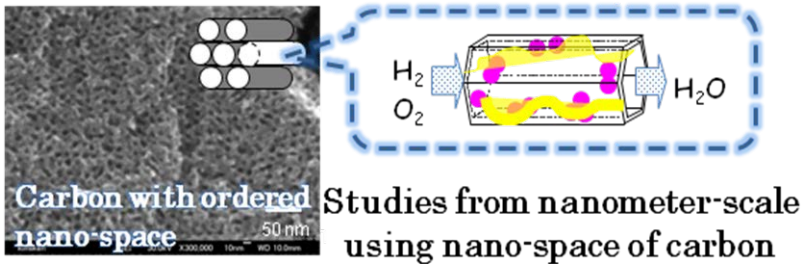

Figure 1. Carbon materials with ordered 8-nm nano-channels. The nano-space is treated as a reaction site.

References

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