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Effect of Carbon Dioxide Cofeed on Decomposition of Methane over Ni Catalysts

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Nickel-catalyzed decomposition of methane was examined in the presence of carbon dioxide cofeed using a thermogravimetric apparatus. Methane was decomposed to hydrogen and multi-walled carbon nanotubes as in the decomposition of pure methane. However, the dry-reforming reaction, gasification of the carbon species with carbon dioxide, and the water gas shift reaction took place simultaneously, and carbon monoxide and water were also formed. Deactivation of the catalyst took place slowly in the presence of carbon dioxide cofeed, and the carbon yield increased with higher partial pressure of carbon dioxide in the feed gas. However, further increase in the carbon dioxide concentration in the feed gas reduced the carbon yield. The most interesting point is that the dry-reforming reaction continued even after carbon formation apparently ceased. Mechanisms for the deactivation of the catalysts are discussed.

Keywords: [Methane decomposition](#), [Carbon dioxide](#), [Nickel catalyst](#), [Carbon nanotube](#), [Glycothermal method](#)



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