the previously suspected structure sensitivity or crystalline surface anisotropy of that reaction, or of any reaction for that matter.

Considering the importance of that work, it is perhaps understandable that this reviewer was disappointed by the chapter on catalysis. On that note, which detracts in no way from the tour de force of Gabor Somorjai's latest (but we hope not the last) book, it is possible to add the teasing if not pedantic note that is the only reward for the delicate task of writing a review. On page 305, the author states that the success of Langmuir's treatment is "due to the relative insensitivity of macroscopic adsorption measurement to the atomic details of the adsorption process." Such hand waving is not acceptable today in view of the quantitative work done by Gabor Somorjai and many other surface scientists over the past 30 years. Thanks to that work, humility is no longer required in catalysis science except in the sense that a true scientist is always humble when talking about his or her own work.

Anyone working in surface science or catalysis science needs a desk copy of Somorjai's latest book.

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New Aspects of Spillover Effect in Catalysis. Edited by T. Inui, K. Fujimoto, T. Uchijima, and M. Masai. Studies in Surface and Catalysis, Vol. 77. Elsevier, Amsterdam, 1993. 435 pp.

The Third International Conference on Spillover was held in Kyoto, Japan, August 17–20, 1993. This book contains the proceedings from this meeting.

The First International Symposium on Spillover of adsorbed species took place in 1983 in Lyons, France. Spillover was found to encompass not only adsorption but gasification of solids, creation of catalytically active sites, and reaction with adsorbed species. The Second International Symposium on Spillover was held in Leipzig in 1989. Additional insights into the spillover of nonhydrogen species, the mechanism and rate of spillover and surface diffusion, and the potential involvement of spillover in applied catalysis were discussed.

The Third International Symposium on Spillover was held in Kyoto in 1993. The focus of the presentations was on the broad extent of the applications of spillover in applied catalysis and the design of catalysts based on the phenomena associated with spillover. It was also apparent that many species were involved in spillover and that, even for a single molecule, different fragments, which also could be in various forms (charged, uncharged, or radical), could be involved in spillover. Indeed, many reactions on catalysts comprising multiple phases were discussed, as was the evidence that spillover might participate in the catalysis. The spillover could be involved during activation or reaction, or to prevent deactivation.

The first several papers in this book discuss several crucial aspects of spillover and are a worthy start for anyone working in heterogeneous catalysis where spillover may contribute. These include extensive perspectives on spillover by Teichner (pp. 27–43). Pajonk (pp. 85–94) discusses the many studies which have attempted to characterize the nature of the spiltover species and Conner discusses the spectroscopic insight into spillover (pp. 61–68). Another paper summarizes the contributions of spillover to catalysis primarily for methanol synthesis and supported MoS_2 catalysts (Barrett *et al.* pp. 207–212). Delmon (pp. 1–8) elucidates the concept of remote control of catalytic activity by spiltover species. The impact of spillover on industrial catalysts is discussed by Fujimoto (pp. 9–16), Inui (pp. 17–26), and Moro-oka (pp. 95–104, for oxygen spillover). The relationship between spillover and catalytic acidity is detailed in an interesting series of papers by Kikuchi and Matsuda (pp. 53–60), Hattori (pp. 69–76), and Nakamura *et al.* (pp. 77–84).

Over 20 other oral papers were presented and many describe more recent findings of spillover in catalytic reactions. These include hydrogen spillover in bimetallics (On *et al.*, pp. 125–130), reversible and irreversible spillover in reforming (Chen *et al.*, pp. 131–136), spillover in oxygenate hydrogenation (Chen and Falconer, pp. 171–176), spillover in membranes (Eguchi *et al.*, pp. 195–201), oxygen spillover in Pt/CeO_2 (Li *et al.*, pp. 217–222), conductivity changes due to spillover (Braunschweig *et al.*, pp. 183–187) observations by photoemission and field ion microscopies (Block *et al.*, pp. 189–194), and methoxy formation during syngas reaction on Pd/Al_2O_3 detected by ^{13}C and ^{1}H NMR (Han *et al.*, pp. 223–228). Forty posters are also included in these proceedings, many suggesting unique applications of spillover.

This book brings up to date the most recent aspects of spillover and truly broadens the areas where spillover is proposed to have an influence. The speculations and data which implicate spillover in a broad series of applied catalysis are intriguing and are worthy of further study. Teichner hypothesizes (p. 39) that there is "a very high probability... [that] spillover does already exist in the mechanism of most catalytic reactions or may be introduced by a new design of catalysts." The book does, however, represent a compendium of studies by those who believe that spillover does or may have a significant impact in catalysis. A certain bias is therefore reflected in many of the papers and the arguments in favor of other explanations are not always discussed in detail. However, with this in mind, this book is crucial background for anyone who comes to conclude that a species formed on one surface may spillover onto another surface (or part of the surface where it does not adsorb directly) on which it may react with the surface or other adsorbed species.

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