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Steps in gas-surface reactions

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Bibliography

- [1] Davy, H. *Philos. Trans. R. Soc.* **107**, 77–85 (1817).
- [2] Berzelius, J. J. *Ann. Chim. Phys.* **61**, 146–151 (1836).
- [3] Henry, W. *Philos. Trans. R. Soc.* **114**, 266–289 (1824).
- [4] Brønsted, J. N. and Pedersen, K. *Z. Phys. Chem. Stoechiom. Verwandtschaftsl.* **108**(185) (1924).
- [5] Langmuir, I. *Nobel Lectures* (1932).
- [6] Davisson, C. J. and Germer, L. H. *Proc. Natl. Acad. Sci. U.S.A.* **14**, 317–322 (1928).
- [7] de Broglie, L. *Recherches sur la théorie des quanta*. PhD thesis, Université Paris-Sorbonne, (1924).
- [8] Davisson, C. and Germer, L. H. *Phys. Rev.* **30**, 705–740 (1927).
- [9] Davisson, C. *Nobel Lectures* (1937).
- [10] Stern, O. *Nobel Lectures* (1946).
- [11] King, D. A. and Wells, M. G. *Surf. Sci.* **29**, 454–482 (1972).
- [12] Auerbach, D. J., Pfnür, H. E., Rettner, C. T., Schlaegel, J. E., Lee, J., and Madix, R. J. *J. Chem. Phys.* **81**, 2515–2516 (1984).
- [13] D’evelyn, M. P., Hamza, A. V., Gdowski, G. E., and Madix, R. J. *Surf. Sci.* **167**, 451–473 (1986).

- [14] Luntz, A. C., Williams, M. D., and Bethune, D. S. *J. Chem. Phys.* **89**, 4381–4395 (1988).
- [15] Lee, M. B., Yang, Q. Y., Tang, S. L., and Ceyer, S. T. *J. Chem. Phys.* **85**, 1693–1694 (1986).
- [16] Rettner, C. T., Pfnür, H. E., and Auerbach, D. J. *Phys. Rev. Lett.* **54**, 2716–2719 (1985).
- [17] Rettner, C. T., Pfnür, H. E., and Auerbach, D. J. *J. Chem. Phys.* **84**, 4163–4167 (1986).
- [18] Luntz, A. C., Brown, J. K., and Williams, M. D. *J. Chem. Phys.* **93**, 5240–5246 (1990).
- [19] Gostein, M., Parhikhteh, H., and Sitz, G. O. *Phys. Rev. Lett.* **75**, 342–345 (1995).
- [20] Juurlink, L. B. F., McCabe, P. R., Smith, R. R., DiCologero, C. L., and Utz, A. L. *Phys. Rev. Lett.* **83**, 868–871 (1999).
- [21] Hundt, P. M., Jiang, B., van Reijzen, M. E., Guo, H., and Beck, R. D. *Science* **344**(6183), 504–507 (2014).
- [22] Juurlink, L. B. F., Killelea, D. R., and Utz, A. L. *Prog. Surf. Sci.* **84**, 69–134 (2009).
- [23] Beck, R. D., Maroni, P., Papageorgopoulos, D. C., Dang, T. T., Schmid, M. P., and Rizzo, T. R. *Science* **302**(5642), 98–100 (2003).
- [24] Killelea, D. R., Campbell, V. L., Shuman, N. S., and Utz, A. L. *Science* **319**, 790–793 (2008).
- [25] Kurahashi, M. and Yamauchi, Y. *Phys. Rev. B* **85**, 161302 (2012).
- [26] Ueta, H. and Kurahashi, M. *Angew. Chem. Int. Ed.* **56**, 4174–4177 (2017).
- [27] Cao, K., van Lent, R., Kleyn, A. W., Kurahashi, M., and Juurlink, L. B. F. *Proc. Natl. Acad. Sci. U.S.A.* **116**, 13862–13866 (2019).

-
- [28] Somorjai, G. A. *Catal. Lett.* **7**(1-4), 169 (1990).
- [29] Vattuone, L., Savio, L., and Rocca, M. *Surf. Sci. Rep.* **63**, 101–168 (2008).
- [30] Hahn, C., Shan, J., Liu, Y., Berg, O., Kleyn, A. W., and Juurlink, L. B. F. *J. Chem. Phys.* **136**, 114201 (2012).
- [31] Veser, G., Thiel, P. A., and Imbihl, R. *J. Phys. Chem.* **98**, 2148–2151 (1994).
- [32] Sander, M., Imbihl, R., and Ertl, G. *J. Chem. Phys.* **97**, 5193–5204 (1992).
- [33] Lawton, T. J., Pushkarev, V., Wei, D., Lucci, F. R., Sholl, D. S., Gellman, A. J., and Sykes, E. C. H. *J. Phys. Chem. C* **117**, 22290–22297 (2013).
- [34] Gellman, A. J., Tysoe, W. T., and Zaera, F. *Catal. Lett.* **145**, 220–232 (2015).
- [35] Mom, R. V., Hahn, C., Jacobse, L., and Juurlink, L. B. F. *Surf. Sci.* **613**, 15–20 (2013).
- [36] Walter, A. L., Schiller, F., Corso, M., Merte, L. R., Bertram, F., Lobo-Checa, J., Shipilin, M., Gustafson, J., Lundgren, E., Brión-Ríos, A. X., Cabrera-Sanfeliix, P., Sánchez-Portal, D., and Ortega, J. E. *Nat. Commun.* **6**, 8903 (2015).
- [37] Janlamool, J., Bashlakov, D., Berg, O., Praserttham, P., Jongsomjit, B., and Juurlink, L. B. F. *Molecules* **19**, 10845–10862 (2014).
- [38] Arulmozhi, N., Esau, D., Lamsal, R. P., Beauchemin, D., and Jerkiewicz, G. *ACS Catal.* **8**, 6426–6439 (2018).
- [39] Besocke, K., Krahl-Urban, B., and Wagner, H. *Surf. Sci.* **68**, 39–46 (1977).
- [40] Liu, H. T., Armitage, A. F., and Woodruff, D. P. *Surf. Sci.* **114**, 431–444 (1982).

- [41] Armitage, A. F., Liu, H. T., and Woodruff, D. P. *Vacuum* **31**, 519–522 (1981).
- [42] Corso, M., Schiller, F., Fernández, L., Cordón, J., and Ortega, J. E. *J. Phys. Condens. Matter* **21**(35), 353001 (2009).
- [43] De Alwis, A., Holsclaw, B., Pushkarev, V. V., Reinicker, A., Lawton, T. J., Blecher, M. E., Sykes, E. C. H., and Gellman, A. J. *Surf. Sci.* **608**, 80–87 (2013).
- [44] Ortega, J. E., Corso, M., Abd-el Fattah, Z. M., Goiri, E. A., and Schiller, F. *Phys. Rev. B* **83**, 085411 (2011).
- [45] Blomberg, S., Zetterberg, J., Zhou, J., Merte, L. R., Gustafson, J., Shipilin, M., Trincherro, A., Miccio, L. A., Magaña, A., Ilyn, M., Schiller, F., Ortega, J. E., Bertram, F., Grönbeck, H., and Lundgren, E. *ACS Catal.* **7**, 110–114 (2017).
- [46] Füchsel, G., Cao, K., Er, S., Smeets, E. W. F., Kleyn, A. W., Juurlink, L. B. F., and Kroes, G. J. *J. Phys. Chem. Lett.* **9**, 170–175 (2018).
- [47] Neugeboren, J., Borodin, D., Hahn, H. W., Altschäffel, J., Kandratzenka, A., Auerbach, D. J., Campbell, C. T., Schwarzer, D., Harding, D. J., Wodtke, A. M., and Kitsopoulos, T. N. *Nature* **558**, 280–283 (2018).
- [48] Chadwick, H., Guo, H., Gutiérrez-González, A., Menzel, J. P., Jackson, B., and Beck, R. D. *J. Chem. Phys.* **148**, 014701 (2018).
- [49] Bernasek, S. L., Siekhaus, W. J., and Somorjai, G. A. *Phys. Rev. Lett.* **30**, 1202–1204 (1973).
- [50] Lang, B., Joyner, R. W., and Somorjai, G. A. *Surf. Sci.* **30**, 440–453 (1972).
- [51] van der Niet, M. J. T. C., den Dunnen, A., Juurlink, L. B. F., and Koper, M. T. M. *J. Chem. Phys.* **132**, 174705 (2010).

-
- [52] Weisstein, E. W. <http://mathworld.wolfram.com/Circle-CircleIntersection.html>. Accessed: 2019-09-05.
- [53] Cao, K. *Structure dependence of molecular reactions on surfaces*. PhD thesis, Leiden University, (2018).
- [54] Auerbach, D. J. In *Atomic Molecular Beam Methods*, Scoles, G., editor, chapter 14, 362–379. Oxford Univ. Press, Oxford (1988).
- [55] Haberland, H., Buck, U., and Tolle, M. *Review of Scientific Instruments* **56**, 1712–1716 (1985).
- [56] Groot, I. M. N. *The fight for a reactive site*. PhD thesis, Leiden University, (2009).
- [57] Gergen, B., Nienhaus, H., Weinberg, W. H., and McFarland, E. W. *Science* **294**, 2521–2523 (2001).
- [58] Meyer, J. and Reuter, K. *Angew. Chemie Int. Ed.* **53**, 4721–4724 (2014).
- [59] Kroes, G. J. *Science* **321**(5890), 794–797 (2008).
- [60] Diaz, C., Pijper, E., Olsen, R. A., Busnogo, H. F., Auerbach, D. J., and Kroes, G. J. *Science* **326**, 832–834 (2009).
- [61] Poelsema, B., Lenz, K., and Comsa, G. *J. Phys. Condens. Matter* **30**(22), 304006 (2010).
- [62] Poelsema, B., Lenz, K., and Comsa, G. *J. Chem. Phys.* **134**, 074703 (2011).
- [63] Cowin, J. P., Yu, C. F., Sibener, S. J., and Wharton, L. *J. Chem. Phys.* **79**, 3537–3549 (1983).
- [64] Sanz, A. S. and Miret-Artés, S. *Phys. Rep.* **451**, 37–154 (2007).
- [65] McCormack, D. A., Olsen, R. A., and Baerends, E. J. *J. Chem. Phys.* **122**(19), 194708 (2005).

- [66] Gee, A. T., Hayden, B. E., Mormiche, C., and Nunney, T. S. *J. Chem. Phys.* **112**, 7660–7668 (2000).
- [67] Salmeron, M., Gale, R. J., and Somorjai, G. A. *J. Chem. Phys.* **67**, 5324–5334 (1977).
- [68] Groot, I. M. N., Schouten, K. J. P., Kleyn, A. W., and Juurlink, L. B. F. *J. Chem. Phys.* **129**, 224707 (2008).
- [69] Groot, I. M. N., Kleyn, A. W., and Juurlink, L. B. F. *Angew. Chemie Int. Ed.* **50**, 5174–5177 (2011).
- [70] Groot, I. M. N., Kleyn, A. W., and Juurlink, L. B. F. *J. Phys. Chem. C* **117**, 9266–9274 (2013).
- [71] Walsh, A. J., van Lent, R., Auras, S. V., Gleeson, M. A., Berg, O. T., and Juurlink, L. B. F. *J. Vac. Sci. Technol. A Vacuum, Surfaces, Film.* **35**(3), 03E102 (2017).
- [72] Samson, P., Nesbitt, A., Koel, B. E., and Hodgson, A. *J. Chem. Phys.* **109**, 3255–3264 (1998).
- [73] Nour Ghassemi, E., Wijzenbroek, M., Somers, M. F., and Kroes, G. J. *Chem. Phys. Lett.* **683**, 329–335 (2017).
- [74] Cao, K., van Lent, R., Kleyn, A. W., and Juurlink, L. B. F. *Chem. Phys. Lett.* **706**, 680–683 (2018).
- [75] Luppi, M., McCormack, D. A., Olsen, R. A., and Baerends, E. J. *J. Chem. Phys.* **123**(16), 164702 (2005).
- [76] Lu, K. E. and Rye, R. R. *Surf. Sci.* **45**, 677–695 (1974).
- [77] Christmann, K., Ertl, G., and Pignet, T. *Surf. Sci.* **54**, 365–392 (1976).
- [78] Salmeron, M., Gale, R. J., and Somorjai, G. A. *J. Chem. Phys.* **70**(6), 2807 (1979).

-
- [79] van Lent, R., Auras, S. V., Cao, K., Walsh, A. J., Gleeson, M. A., and Juurlink, L. B. F. *Science* **363**(6423), 155–157 (2019).
- [80] Christmann, K. and Ertl, G. *Surf. Sci.* **60**, 365–384 (1976).
- [81] Graham, A. P., Menzel, A., and Toennies, J. P. *J. Chem. Phys.* **111**, 1676–1685 (1999).
- [82] Kristinsdóttir, L. and Skúlason, E. *Surf. Sci.* **606**, 1400–1404 (2012).
- [83] Olsen, R. A., Kroes, G. J., and Baerends, E. J. *J. Chem. Phys.* **111**, 11155–11163 (1999).
- [84] Jardine, A. P., Lee, E. Y. M., Ward, D. J., Alexandrowicz, G., Hedge-land, H., Allison, W., Ellis, J., and Pollak, E. *Phys. Rev. Lett.* **105**, 136101 (2010).
- [85] Bădescu, Ș. C., Salo, P., Ala-Nissila, T., Ying, S. C., Jacobi, K., Wang, Y., Bedürftig, K., and Ertl, G. *Phys. Rev. Lett.* **88**, 136101 (2002).
- [86] Zheng, C. Z., Yeung, C. K., Loy, M. M. T., and Xiao, X. *Phys. Rev. B* **70**, 205402 (2004).
- [87] Zheng, C. Z., Yeung, C. K., Loy, M. M. T., and Xiao, X. *Phys. Rev. Lett.* **97**, 166101 (2006).
- [88] Olsen, R. A., Bădescu, Ș. C., Ying, S. C., and Baerends, E. J. *J. Chem. Phys.* **120**, 11852–11863 (2004).
- [89] Hahn, E., Schief, H., Marsico, V., Fricke, A., and Kern, K. *Phys. Rev. Lett.* **72**, 3378–3381 (1994).
- [90] den Dunnen, A. *Surface-structure dependencies in catalytic reactions*. PhD thesis, Leiden University, (2015).
- [91] Comsa, G., Mechttersheimer, G., and Poelsema, B. *Surf. Sci.* **97**(1), L297 – L303 (1980).

- [92] Balmes, O., Prevot, G., Torrelles, X., Lundgren, E., and Ferrer, S. *ACS Catal.* **6**(2), 1285–1291 (2016).
- [93] Calle-Vallejo, F., Loffreda, D., Koper, M. T. M., and Sautet, P. *Nat. Chem.* **7**, 403–410 (2015).
- [94] Calle-Vallejo, F., Tymoczko, J., Colic, V., Vu, Q. H., Pohl, M. D., Morgenstern, K., Loffreda, D., Sautet, P., Schuhmann, W., and Bandarenka, A. S. *Science* **350**, 185–189 (2015).
- [95] Stephens, I. E. L., Bondarenko, A. S., Grønbjerg, U., Rossmeisl, J., and Chorkendorff, I. *Energy Environ. Sci.* **5**, 6744–6762 (2012).
- [96] Ertl, G. *Angew. Chem. Int. Ed.* **47**(19), 3524–3535 (2008).
- [97] Nørskov, J. K., Bligaard, T., Logadottir, A., Bahn, S., Hansen, L. B., Bollinger, M., Benggaard, H., Hammer, B., Sljivancanin, Z., Mavrikakis, M., Xu, Y., Dahl, S., and Jacobsen, C. J. H. *J. Catal.* **209**(2), 275–278 (2002).
- [98] Verheij, L. K. and Hugenschmidt, M. B. *Surf. Sci.* **416**(1-2), 37–58 (1998).
- [99] Michely, T. and Comsa, G. *Surf. Sci.* **256**, 217 – 226 (1991).
- [100] Bondü, C. J., Calle-Vallejo, F., Figueiredo, M. C., and Koper, M. T. M. *Nat. Catal.* **2**, 243–250 (2019).
- [101] Gee, A. T. and Hayden, B. E. *J. Chem. Phys.* **113**, 10333–10343 (2000).
- [102] Jacobse, L., den Dunnen, A., and Juurlink, L. B. F. *J. Chem. Phys.* **143**, 014703 (2015).
- [103] van der Niet, M. J. T. C., den Dunnen, A., Juurlink, L. B. F., and Koper, M. T. M. *Angew. Chem. Int. Ed.* **49**(37), 6572–6575 (2010).
- [104] Verheij, L. K., Hugenschmidt, M. B., Poelsema, B., and Comsa, G. *Surf. Sci.* **233**, 209–222 (1990).

-
- [105] Gee, A. T., Hayden, B. E., Mormiche, C., and Nunney, T. S. *Surf. Sci.* **512**(3), 165–172 (2002).
- [106] Honkala, K., Hellman, A., Remediakis, I. N., Logadottir, A., Carlsson, A., Dahl, S., Christensen, C. H., and Nørskov, J. K. *Science* **307**, 555–558 (2005).
- [107] Behrens, M., Studt, F., Kasatkin, I., Kühl, S., Hävecker, M., Abild-Pedersen, F., Zander, S., Girgsdies, F., Kurr, P., Knief, B.-L., Tovar, M., Fischer, R. W., Nørskov, J. K., and Schlögl. *Science* **336**(6083), 893–897 (2012).
- [108] Hoffmann, F. M. *Surf. Sci. Rep.* **3**, 107–192 (1983).
- [109] Chabal, Y. J. *Surf. Sci. Rep.* **8**(5-7), 211–357 (1988).
- [110] Greenler, R. G. *J. Chem. Phys.* **50**, 1963 (1969).
- [111] Greenler, R. G. *J. Chem. Phys.* **44**(1), 310–315 (1966).
- [112] Suzaki, Y. and Tachibana, A. *Appl. Opt.* **14**, 2809–2810 (1975).
- [113] Ertl, G. *Reactions at solid surfaces*, volume 14. John Wiley & Sons, (2010).
- [114] McEwen, J.-S., Payne, S. H., Kreuzer, H. J., Kinne, M., Denecke, R., and Steinrück, H.-P. *Surf. Sci.* **545**, 47–69 (2003).
- [115] Steininger, H., Lehwald, S., and Ibach, H. *Surf. Sci.* **123**(2-3), 264–282 (1982).
- [116] Baro, A. M. and Ibach, H. *J. Chem. Phys.* **71**, 4812 (1979).
- [117] Ogletree, D. F., Van Hove, M. A., and Somorjai, G. A. *Surf. Sci.* **173**, 351–365 (1986).
- [118] Ertl, G., Neumann, M., and Streit, K. M. *Surf. Sci.* **64**(2), 393–410 (1977).
- [119] Yang, H. J., Minato, T., Kawai, M., and Kim, Y. *J. Phys. Chem. C* **117**, 16429–16437 (2013).

- [120] Ryberg, R. *Phys. Rev. B* **40**(1), 865 (1989).
- [121] Malik, I. J. and Trenary, M. *Surf. Sci. Lett.* **214**, L237–L245 (1989).
- [122] Xu, J. and Yates, J. T. *Surf. Sci.* **327**, 193–201 (1995).
- [123] Mukerji, R. J., Bolina, A. S., and Brown, W. A. *Surf. Sci.* **527**, 198–208 (2003).
- [124] Tränkenschuh, B., Fritsche, N., Fuhrmann, T., Papp, C., Zhu, J. F., Denecke, R., and Steinrück, H.-P. *J. Chem. Phys.* **124**(7), 074712 (2006).
- [125] Tränkenschuh, B., Papp, C., Fuhrmann, T., Denecke, R., and Steinrück, H.-P. *Surf. Sci.* **601**, 1108–1117 (2007).
- [126] Shimizu, S., Noritake, H., Koitaya, T., Mukai, K., Yoshimoto, S., and Yoshinobu, J. *Surf. Sci.* **608**, 220–225 (2013).
- [127] van Hove, M. A. and Somorjai, G. A. *Surf. Sci.* **92**, 489 (1980).
- [128] Yoshinobu, J., Tsukahara, N., Yasui, F., Mukai, K., and Yamashita, Y. *Phys. Rev. Lett.* **90**, 248301 (2003).
- [129] Blyholder, G. *J. Phys. Chem.* **68**(10), 2772–2777 (1964).
- [130] Crossley, A. and King, D. A. *Surf. Sci.* **68**, 528–538 (1977).
- [131] Horn, K. and Pritchard, J. *J. Phys. Colloq.* **38**(C4), 164–171 (1977).
- [132] Hollins, P. *Surf. Sci. Rep.* **16**, 51–94 (1992).
- [133] Froitzheim, H., Hopster, H., Ibach, H., and Lehwald, S. *Appl. Phys.* **13**, 147–151 (1977).
- [134] Herzberg, G. *Molecular spectra and molecular structure, vol II*. Van Nostrand Reinhold Company, (1945).
- [135] Nagaoka, S. I., Teramae, H., and Nagashima, U. *J. Chem. Educ.* **90**, 669–670 (2013).

-
- [136] Yoder, B. L. *Steric Effects in the Chemisorption of Vibrationally Excited Methane on Nickel*. PhD thesis, L'École Polytechnique Fédérale de Lausanne, (2012).
- [137] Rothman, L. S., Gordon, I. E., Barbe, A., Benner, D. C., Bernath, P. F., Birk, M., Boudon, V., Brown, L. R., Campargue, A., Champion, J. P., Chance, K., Coudert, L. H., Dana, V., Devi, V. M., Fally, S., Flaud, J. M., Gamache, R. R., Goldman, A., Jacquemart, D., Kleiner, I., Lacome, N., Lafferty, W. J., Mandin, J. Y., Massie, S. T., Mikhailenko, S. N., Miller, C. E., Moazzen-Ahmadi, N., Naumenko, O. V., Nikitin, A. V., Orphal, J., Perevalov, V. I., Perrin, A., Predoi-Cross, A., Rinsland, C. P., Rotger, M., Šimečková, M., Smith, M. A., Sung, K., Tashkun, S. A., Tennyson, J., Toth, R. A., Vandaele, A. C., and Vander Auwera, J. *J. Quant. Spectrosc. Ra.* **110**(9-10), 533–572 (2009).
- [138] Demtröder, W. *Laser Spectroscopy: Basic Concepts and Instrumentation*. Springer-Verlag, (1981).
- [139] Bennett, W. R. *Phys. Rev.* **126**, 580–593 (1962).
- [140] Lamb, W. E. *Phys. Rev.* **134**, A1429–A1450 (1964).
- [141] Chadwick, H., Hundt, P. M., van Reijzen, M. E., Yoder, B. L., and Beck, R. D. *J. Chem. Phys.* **140**, 034321 (2014).
- [142] Juurlink, L. B. F. *Eigenstate-resolved measurements of methane dissociation on Ni(100)*. PhD thesis, Tufts University, (2000).
- [143] Miller, R. E. *Rev. Sci. Instrum.* **53**, 1719–1723 (1982).
- [144] Ebbing, D. D. and Gammon, S. D. *General Chemistry*. Houghton Mifflin Company, 9 edition, (2009).

Chapter 3

Site-specific reactivity of molecules with surface defects – the case of H₂ dissociation on Pt

R. van Lent, S. V. Auras, K. Cao, A. J. Walsh, M. A. Gleeson, L. B. F. Juurlink *Science* **363**(6423) 155-157 (2019)

- Gekromd vlak zet zaken recht
A. Dijkgraaf *C2W* **4** (2019)
- Een fundamentele controverse beslecht
L.B.F. Juurlink *Nederlands Tijdschrift voor Natuurkunde* **85**(3) (2019)
- Chemists solve persistent problem after four decades
B. Benda *Universiteit Leiden FWN nieuwsbrief* **11**(1) (2019)
- Leidse onderzoekers ontrafelen reacties met waterstof
R. Canrinus-Moezelaar *NEMO Kennislink* January 2019
- Highlight DIFFER: hardnekkig katalysator-probleem na 40 jaar opgelost
M. Vianen *Inside NWO-I nieuwsbrief* (2) (2019)

Chapter 4:

Two-faced step edges in HD exchange on Pt

R. van Lent, K. Cao, S. V. Auras, A. J. Walsh, M. A. Gleeson, L. B. F. Juurlink *To be submitted*

Chapter 5:

Step type dependence of oxygen reduction on Pt(1 1 1) surfaces

R. van Lent, A. den Dunnen, S. V. Auras, A. J. Walsh, M. A. Gleeson, L. B. F. Juurlink *To be submitted*

Chapter 6:

Step-type and step-density influences on CO adsorption probed by reflection absorption infrared spectroscopy using a curved Pt(1 1 1) surface

A. J. Walsh, R. van Lent, S. V. Auras, M. A. Gleeson, O. T. Berg, L. B. F. Juurlink *J. Vac. Sci. Tech. A* **35**,(3) 03E102 (2017)

Other publications:

A molecular beam study of D₂ dissociation on Pt(1 1 1): Testing SRP-DFT calculations

K. Cao, R. van Lent, A. W. Kleyn, L. B. F. Juurlink *Chem. Phys. Lett.* **706** 680-683 (2018)

Steps on Pt stereodynamically filter sticking of O₂

K. Cao, R. van Lent, A. W. Kleyn, M. Kurahashi, L. B. F. Juurlink *Proc. Natl. Acad. Sci. USA* **116**(28) 13862-138866 (2019)

It's not just the defects – a curved crystal study of H₂O desorption from Ag

S. V. Auras, R. A. B. van Bree, D. L. Bashlakov, R. van Lent, L. B. F. Juurlink *Phys. Chem. Chem. Phys.* **21**(28) 15422-15430 (2019)

Heterogeneous Catalytic Oxidation of Ammonia by Various Transition Metals

P. C. M. Laan, M. C. Franke, R. van Lent, L. B. F. Juurlink *J. Chem. Educ.* **96**(10) 2266-2270 (2019)