fraction at the critical charge transfer is 0.32±0.03,[14] compared to the calculated value of 0.29. It is also less than the maximum possible place-exchange fraction of 0.33.

To summarize the course of reaction steps just discussed, the following model of surface oxidation can be deduced by assuming an ideal $(\sqrt{3} \times \sqrt{3})R30°$ structure upon completion of a monolayer oxidation. Note that the coefficients in the equations are not simple stoichiometric ratios of the chemical reactions but indicate the fractional coverage by the platinum species.

$$\mathrm{Pt} + \frac{1}{3}\mathrm{H_2O} \rightarrow \frac{2}{3}\mathrm{Pt} + \frac{1}{3}\mathrm{PtOH} + \frac{1}{3}\mathrm{H^+} + \frac{1}{3}\mathrm{e^-} \quad (1)$$

$$\frac{2}{3}\mathrm{Pt} + \frac{1}{3}\mathrm{PtOH} + \frac{2}{3}\mathrm{H_2O} \rightarrow \frac{2}{3}\mathrm{PtOH} + \frac{1}{3}\mathrm{OPt} + \mathrm{H^+} + \mathrm{e^-} \quad (2)$$

$$\frac{2}{3}\mathrm{PtOH} + \frac{1}{3}\mathrm{OPt} \rightarrow \frac{2}{3}\mathrm{PtO} + \frac{1}{3}\mathrm{OPt} + \frac{2}{3}\mathrm{H^+} + \frac{2}{3}\mathrm{e^-} \quad (3)$$

Note that OPt represents a place-exchanged PtO. The first and second steps occurred abruptly corresponding to Peaks I and II in the voltammogram, respectively, while the last step occurs continuously over a wide potential range corresponding to the slow and continuous rise of the anodic current.

Conclusions

In this article we have reviewed elementary aspects of the synchrotron-based x-ray-scattering technique for the investigation of the structure of electrochemical interfaces and some of its preliminary applications for the investigation of "buried" liquid/solid interfaces. We have shown its capability for providing detailed structural information on liquid/solid interfaces. We expect that, as the operation of the high-energy synchrotron sources advances, liquid/solid interface studies will also advance closer to the maturity level of current UHV surface science and beyond.

Acknowledgment

This work was sponsored by the Division of Materials Sciences, Office of Basic Energy Sciences, U.S. Department of Energy, under Contract W-31–109-ENG-38.

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https://doi.org/10.1017/S0883769400069992 Published online by Cambridge University Press