Haseltine and his colleagues have now compared the sequences of this region, which is roughly 1600 base pairs long, from HTLV-I and -II. They find the first 600 base pairs to be very different in the two viruses, whereas the last 1000 are very highly conserved. More than 80 percent of the amino acids in the proteins encoded by the conserved regions should be identical. "No other open reading frame has such a high degree of conservation," Haseltine says. "We predict that it will encode a protein that will affect transcription."

Essex and Tun-Hou Lee, also at the Harvard School of Public Health, have identified in HTLV-I transformed cell lines a viral protein with a molecular weight of 42,000, about the right size for a protein encoded by the long open reading frame. In one transformed line, which originated in Gallo's laboratory, it is the only viral protein made. This line is just as effective in stimulating transcription from the HTLV-I LTR as lines that make infectious viral particles. The Haseltine and Essex groups have shown that the 42-kilodalton protein is not related to the viral polymerase or structural proteins and that it is at least partly derived from the conserved reading frame. "So it proves that the long open reading frame is used," Haseltine says.

The HTLV's may not be the only RNA-transforming viruses that operate by *trans* regulation of gene transcription. Bovine leukemia virus induces a disease very similar to the leukemia associated with HTLV-I. The sequence of the bovine virus has recently been determined by Arsene Burny of the University of Brussels. It, too, contains a long open reading frame just inside the 3′ LTR. The amino acid sequence of the protein encoded by this region is different from that of the comparable HTLV protein, but they both have similar arrangements of hydrophobic and hydrophilic regions.

If the proposed mechanism for transformation by the HTLV's is correct, then the way might be open to finding means of preventing or treating the cancers caused by the agents. For example, a vaccine might be derived from a virus modified so that it no longer produces the transcription-stimulating protein. For therapy, it might be possible to attach a lethal gene to an LTR that has been altered so that it works only in tumor cells that were transformed by HTLV-I or -II. That gene, if introduced into cells, would be transcribed in—and kill—only the tumor cells. At the very least, the new results on the HTLV's should open new lines of inquiry.

—JEAN L. MARX

A Look at the Surface of Platinum

Despite the importance of platinum in industrial catalysis and in various types of electrodes, particularly those in fuel cells, remarkably little is known about what happens to it when it is degraded during use. In particular, there has been a great controversy over the oxidation state of its surface under such conditions; different investigators have assigned as many as three different oxidation states to materials produced under a given set of conditions.

Some of the controversy may be reduced by work reported recently* by Marcell Peuckert of the Institut für Grenzflächenforschung und Vakuumphysik der Kernforschungsanlage Jülich GmbH in West Germany. Peuckert has used x-ray photoelectron spectroscopy (XPS), Auger spectroscopy, electron energy loss spectroscopy (EELS), and thermal decomposition techniques—perhaps the broadest array of investigative methods that has been applied to the problem—to define the surface composition of platinum oxides produced by four different techniques. He has found that the composition is different in each case.

Peuckert used one surface of a single platinum crystal because problems have been created in the past by grain boundaries in polycrystalline materials. He then oxidized the surface by one of four different treatments: (i) heating at 900 K in flowing oxygen, (ii) electrochemical oxidation at 3 volts in a sulfuric acid electrolyte, (iii) anodic polarization in sodium hydroxide electrolyte, and (iv) etching in hot concentrated nitric acid.

Perhaps his least controversial result is for acid oxidation. Peuckert finds that the species produced is the tetravalent hydroxide, $Pt(OH)_4$. This is in agreement with results produced by others, especially Phillip Ross of the Lawrence Berkeley Laboratory. In fact, Peuckert performed the experiment at only one potential, whereas Ross will report soon in *Surface Science* that he has observed the same composition over a broad range of potentials.

Somewhat more controversy surrounds the results for gas phase oxidation. Some investigators, such as Gabor Somorjai of the University of California, Berkeley, have found that only a small amount of oxygen is chemisorbed to the platinum surface before atomic oxygen begins to penetrate into the metal. Others, including Ross and Peter Norton of Atomic Energy Canada, Ltd., have observed very high concentrations of chemisorbed oxygen. Peuckert's results support the latter observation, and he finds that the surface composition is PtO_2. A question remains about the generality of his observation, however. Rustum Roy of the Pennsylvania State University has found that Pt_3O_4 can be formed in certain regions of temperature and pressure; Roy was working with bulk materials, however, and it is not clear whether his results can be extrapolated to surfaces.

Peuckert's other results are probably less controversial if only because there has been very little study of those conditions. In hot acid, he finds that the surface species is hydrated platinum oxide, $PtO_2 \cdot nH_2O$. James Hoare of the General Motors Research Center has found that the surface species under similar conditions is PtO_2, but his studies were performed with techniques that would not necessarily have revealed the water of hydration. Peuckert's results in the basic electrolyte are perhaps the least clear cut: he finds that the composition is "approximately" $PtO(OH)_2$, and he is working to refine his measurement.

Peuckert's results may help to clear up some of the controversy about the composition of passivation layers of platinum, but it leaves one problem area unresolved. "What we would really like to know," says Ross, "is the nature of the surface states formed at the potentials present in a fuel cell. Unfortunately, those species all disappear when the electrode is removed from the cell and placed in the vacuum chamber for study. Our best hope now is that if we can understand what is happening at higher potentials, such as those measured by Marcell and us, perhaps we can extrapolate back to what is happening in the real world."—THOMAS H. MAUGH II

*Presented 6 June at a symposium, "New Eyes/New Insights," at the Center for Catalytic Science and Technology at the University of Delaware.