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"Ellipsometry Studies of Oxides

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THIRD QUARTER

RESEARCH PLAN

The work in this quarter has been devoted to ellipsometry studies of oxides deposited by anodization.

RESULTS

Typical results are summarized in the attached Table. They show that it is possible to measure the surface roughness at the interface between the oxide and the semiconductor, the fraction of oxide in relation to semiconductor in the rough layer, as well as the thickness of the oxide. It should be noted that the accuracy of this determination is far greater and more dependable than the accuracy of the determination of the oxide thickness made by single wave[illegible]ths ellipsometer. The reason is that no assumptions are made here as to the optical properties of the oxide or of the semiconducting substrate since both can be measured separately.

The results show also that it is possible to study the effects of different chemical attacks on the surface (see attached table). An examples of the study of the surface after removal of the oxide is given for illustration. One sees that a lactic acid dissolution of a 256Å thick oxide layer leaves behind a 9Å thick layer of native oxide coating the original interface layer of which the thickness is almost unchanged (12Å compared to 15Å).

APPLICATION TO ELLIPSOMETRY TO ANODIC OXIDES

	OX	F	DR	N
# 1 WITH OXIDE	256Å	35	15Å	2.24
OXIDE REMOVED	9Å	33	12Å	2.21
#2 WITH OXIDE	554Å	36	15Å	2.28

OX = OXIDE THICKNESS

F = VOLUME FRACTION OF OXIDE IN THE INTERFACE REGION

DR = THICKNESS OF THE INTERFACE REGION

N = INDEX OF REFRACTION OF THE OXIDE BELOW THE OPTICAL GAP