CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Adsorption isotherms for AOT (anionic) and Tween 20 (nonionic) surfactants together with their competitive adsorption on gold are presented. In the case of AOT, the adsorbed mass increases above the CMC thought to be due to the impurities in the AOT solution that can cause an increase of mass adsorbed in adsorbed phase. The dissipation shows similar behavior, although in this case the increase in dissipation above the CMC is larger than that below the CMC although eventually a constant value is reached. Tween 20 shows much stronger adsorption in that mass adsorbed is constant at ~ 0.15(CMC); in addition the dissipation is less. Finally, dissipation values do not exceed the criteria (2×10^{-6}) for which the Sauerbrey model becomes inaccurate.

For the addition of AOT to a Tween 20-covered surface, Tween 20 desorbs at very low AOT concentrations likely to form mixed micelles with AOT. As concentration of AOT increases, the mass adsorbed increases until reaching that of pure Tween 20. Upon the addition of Tween 20 to an AOT-covered surface, no initial drop in adsorbed amount occurs instead the adsorbed mass increases monotonically until again reaching the adsorbed mass of a pure Tween 20 surface. Evidence of non-equilibrium behavior was also seen in experiments with both the pure surfactants as well as the surfactant mixtures.

A two-step adsorption model is used to calculate the rate constants for adsorption of surfactants with time. Adsorption rate for AOT is slow both below and above the CMC, suggesting that the impurities in AOT solution can desorb from gold and lead to slow adsorption. Tween 20 adsorption is fast and the adsorption behavior is that typically found for most surfactants except a peak in adsorption vs. time for a concentration of 1.4(CMC) which was attributed to impurities.

5.2 Recommendations

The studies of adsorbed mass and dissipation of pre-mixed surfactant systems by varying molar ratio of the mixture might help better understanding of the results obtained in this work (the effect of sequential addition).