Ref. 102 "NEW ASPECTS ON THE ACTIVATION ENERGY FOR CVD DIAMOND GROWTH", Evaldo José Corat[1,3*], Rita de Cássia Mendes de Barros[1,2] Vladimir Jesus Trava-Airoldi[1,3*] e Nélia Ferreira Leite[1], 1)-LAS/INPE, São José dos Campos, SP, 2)-ITA/CTA, São José dos Campos, SP, 3)FE/USF, Itatiba, SP.*

The determination of the activation energy is fundamental for understanding the limiting steps in the reactive growth process. Older studies have shown activation energies in the range 20 - 30 kcal/mol that are explained as a net result of the temperature dependence of methyl radical incorporation reaction and of its reactants. Newer results show lower activation energies around 11 kcal/mol for the 600 - 900 °C range, and a reduction of the activation energy for lower temperatures. Our studies on the activation energy for diamond growth from halogenated mixtures indicate 11 kcal/mol for the full range, from 250 to 900 °C. In this study we speculate that the main difference between our results and of other authors is in the method for growth rate determination. We measure the mass variation while the other determinations measure volume variation. In this sense, our determination measures the incorporation of carbon atoms, independently of structure variation and voids formation. It seems from this aspects that the apparent reduction of activation energy at lower temperatures is an effect of the reduction of film density.

Ref. 103 "VACUUM METROLOGY", Ross Alan Douglas, IFGW/DFA/UNICAMP, Campinas, SP.

The development of vacuum techniques was fundamental for the realization of experiments leading to many advances in modern science. One hundred years ago (1897) Sir J.J.Thomson measured the charge to mass ratio of the corpuscles transmitted in cathode rays and discovered the electron. It was the first indentification of a sub-atomic particle. This discovery was soon followed by the observation of isotopes by means of simple mass spectrommeters operating in chambers from which most of the residual gases had been removed, thus initiating the era of high vacuum physics. The efficient modern study of surfaces depends on the production and maintenance of reproducible, clean surfaces for intervals of time which are sufficient to make measurements. This requires attaining very low pressures in the ultra high vacuum range.The properties of these clean surfaces are studied by observing interactions of various beams such as electrons, photons, atoms, molecules and ions with a sample. The emissions resulting from these bombardments are analyzed by a variety of instruments to obtain their mass, momentum, energy, intensity, angular distribution and polarization. Combining these data with theoretical models provides information morphologies, elemental and chemical compositions, electronic, vibrational, geometrical structures of the surface and sucessive layers of the sample. These studies are applicable to areas of scientific and thecnological importance, alist of which would include catalysis, corrosion, oxidation molecular bean epitaxy, super lattices and magnetic monolayers. Fundamental to these techniques is the existence of ultra high vacuum and its characterization through vacuum metrology.