A true understanding of chemical reaction dynamics will require experiments to be performed at the level of a single molecule where the averaging associated with the studies of large number of molecules, i.e., an ensemble, is no longer necessary. This fact was acknowledged recently by awarding the Nobel Prize to Eric Betzig, Stefan W. Hell and William E. Moerner "for the development of super-resolved fluorescence microscopy" to make such studies possible using radiation and 3 decades ago to Gerd Binnig and Heinrich Rohrer "for their design of the scanning tunneling microscope" which made single molecule studies possible using electrons. Clearly the next step along this path is the development of techniques that can both provide a physical image of a single molecule during a reaction and simultaneously allow spectroscopic information to be derived about the identity of not only the reactants and products but also about the nature of the transient structures that occur during the course of the reactive transformation. There are many ways that is objective could be achieved, one of course is to combine electronic imaging and radiation spectroscopies as per Tip Enhanced Raman Spectroscopy (TERS). Here I will discuss the use of two methods, STM imagining and spectroscopies and TERS. Both very powerful probe techniques that were used to study the dynamics of single molecule reactions. I will report the use of an STM to study hydrogen transfer reactions within a single molecule on Cu(110) and (111) surfaces, i.e., the tautomerization porphycenes- a very important model system for many biological and chemical processes. I will also discuss the use of TERS to study the formation, structure and spectra of graphene nano-ribbons on the Au(111) surface. The strengths and current problems associated with the TERS technique, which is potentially the most powerful surface science tool currently available, will also be discussed.