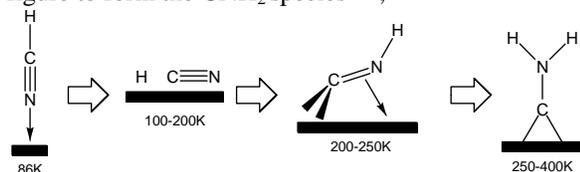


KINETICS OF AMINOCARBYNE FORMATION ON Pt(111)

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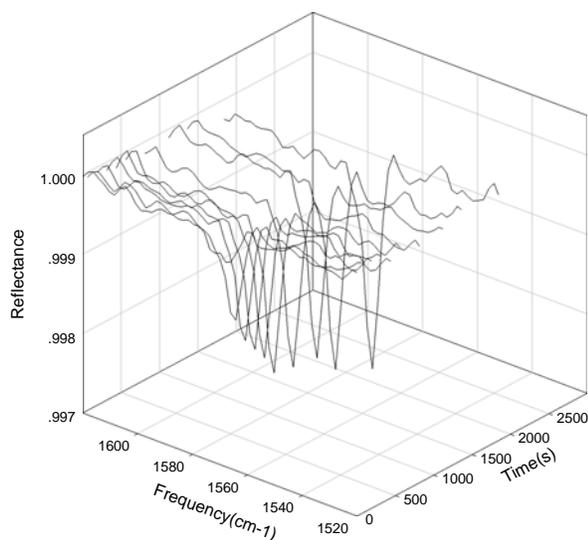
ABSTRACT

The formation of the aminocarbene species (CNH_2) from HCN on the Pt(111) surface has been studied experimentally with time-resolved reflection absorption infrared spectroscopy (RAIRS). At a temperature between 100 and 450 K, the adsorbed HCN undergoes the reaction depicted in the following figure to form the CNH_2 species^{1,2},

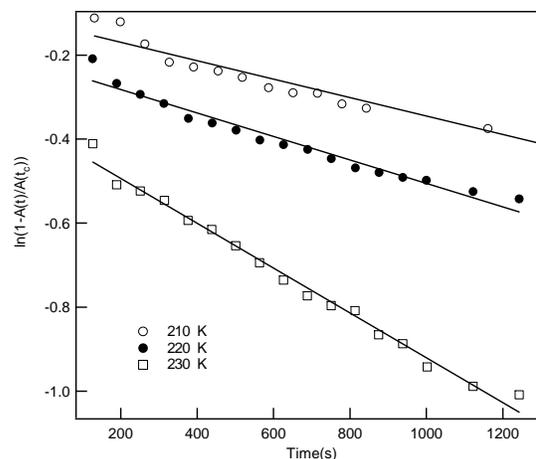


which is characterized by the NH_2 bending mode at 1567 cm^{-1} . The CNH_2 coverage is measured with RAIRS as a function of time.

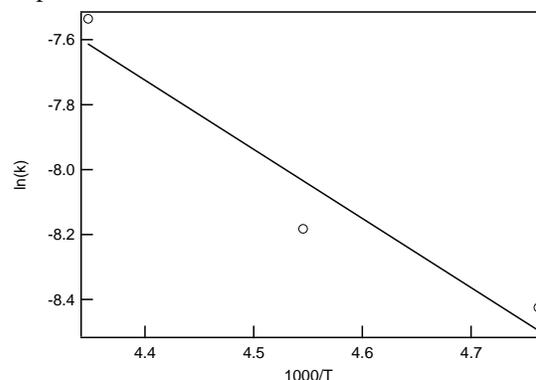
0.2L of HCN on Pt(111) at 220K



A plot of $\ln[1 - A(t)/A(t_c)]$ as a function of time, where $A(t)$ is the area of the NH_2 bending mode at time t and $A(t_c)$ is the area at the completion of the reaction, indicates first-order kinetics for CNH_2 formation between 100 and 1300 seconds, similar to the linearity of NH formation on Pt(111)³,



The following figure shows the rate constant $\ln(k)$ as a function of $1/T$, where $\ln(k)$ is the slope of $\ln[1 - A(t)/A(t_c)]$ as a function of time, and T is the temperature.



The slope gives an Arrhenius activation barrier (E_a) of 0.23 eV for CNH_2 formation.

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