

# 氯化鉀在矽(100)晶面上的原子結構

學生：邱祺雄

指導教授：林登松 教授

國立交通大學物理研究所碩士班

## 摘 要

本文主要是研究氯化鉀薄層在 Si(100)-2×1 上的原子結構。有別於以往文獻中直接蒸鍍離子固體到樣品表面上的方法；我們的實驗方法是分別吸附氯和鉀原子到矽(100)表面上，可以藉此觀察氯化鉀在矽(100)表面上的成長機制並得到單層的氯化鉀薄層於矽(100)表面上的原子結構。由掃描取得的 STM 影像我們得知：

- (a).在 Si(100)-2×1 : Cl 表面上蒸鍍鉀，鉀原子會在表面上移動，在表面能量降低的狀態下逐漸的與氯鍵結形成氯化鉀薄層，並慢慢擴大薄層的面積。
- (b).成長的模式是以單層氯化鉀薄層的方式成長。
- (c).由 STM 影像中我們可以推論氯化鉀在矽晶面上為 2×2 的原子結構，晶格常數上的差異使得氯化鉀的原子結構有所不同。
- (d).偶極距方向為平行樣品表面的方向。
- (e).我們交換原子吸附到矽(100)表面上的順序，一樣能夠得到相似的氯化鉀薄層之原子結構
- (f).在本實驗室過去對氯化鉀在矽晶面上使用 XPS 的研究結果得知氯化鉀與矽之介面沒有電子轉移現象，而為類似地毯附著在表面。

# The structure of KCl on the Si(100) surface

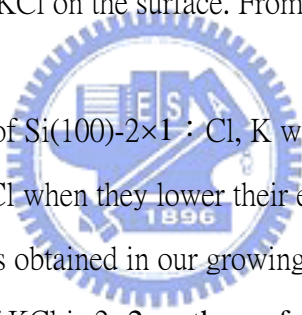
Student : Chi-Hsiung Chiu

Advisor : Deng-Sung Lin Ph.D.

Institute of Physics  
National Chiao Tung University

## Abstract

In the thesis, we investigate on atomic structure of the thin KCl layer on the Si(100)-2×1 surface. Being different from the conventional way of depositing KCl molecules to the surface of sample directly, our method is that Cl and K are absorbed by surface of silicon(100) separately. And so as to observe the mechanism of KCl growing we get the atomic structure of KCl on the surface. From the images of STM, we conclude that :

- 
- (a) Coating to the surface of Si(100)-2×1 : Cl, K will move along the surface and bind with Cl to form layers of KCl when they lower their energy.
  - (b) A single layer of KCl is obtained in our growing method.
  - (c) The atomic structure of KCl is 2×2 on the surface of silicon because the different lattice constant between them alter the atomic structure.
  - (d) The direction of dipole moment lays in the plane of the sample surface.
  - (e) Besides, we can still get similar atomic structure when we interchanged the order of adsorbing different atoms(K and Cl) to the surface.
  - (f) According to the previous result that by using XPS on the surface of KCl in our Lab , we know that there is not any transfer of electrons between KCl and the surface of silicon. The ionic layer on the silicon surface is like the rug on the floor.