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# Pt(110) 표면위에 형성된 Fe-Pt 합금의 자성 및 원자구조 연구
## (Magnetism and Atomic Structure of Fe-Pt alloy formed on Pt(110))

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Tough the ultrathin magnetic films have drawn a lot of attention for the last two decades, there has still been a lot of interests in the area of low dimensional magnetic nano-structures. This magnetic surface has been studied by various scanning probes such as scanning tunneling microscope(STM). The accurate atomic structure of these thin films is quite essential for understanding the surface magnetism.

We have chosen Pt(110) surface since this surface can be used as a template for making magnetic nano wires using its missing low structure. We have noticed that the low temperature deposition is one of the possibility to prevent the intermixing to form a nano wire made of Fe along this missing row. Clean surface of Pt(110) reveals the missing row reconstruction(2X1) all over the surface quite clearly. Our STM image can distinguish the Pt atoms in the same row. However, in large scale, this surface shows fish-scale structures which are not quite clearly understood in its origin. This structure creates a lot of steps and kinks so that the reaction with gas molecules or the formation of alloys has been enhanced a lot.

In the phase diagram of Fe-Pt, three possible alloy phases can be found according to the concentration and the temperature. Generally the surface is quite different from the bulk so that two components at the surface could form an alloy while they are immisible in the bulk or they are phase-separated while they form a solid solution in bulk phase. We have shown two types of surface alloy structure mostly depending on the annealing temperature within the thickness range of 5ML.

Once several monolayers of Fe is deposited on Pt(110) surface, (2X1) periodicity cannot be sustained. It is due to the intermixing at the initial stage. Annealing this at 600K results in the overall phase of (1X2), which is quite dramatic. This phase is expected to be a (110) surface of $FePt_3$. Further annealing of this results in (1X2) phase, which seems to be quite similar to the missing row structure. We have applied surface magneto-optic Kerr effect(SMOKE) to study the magnetic property of each alloy system. The disappearance of the MOKE pattern after the annealing, suggests the possibility of para- or antiferromagnetic phase. Antiferromagnetism of very thin films has never been probed tough quite recently spin-polarized STM is used for the surface of bulk antiferromagnet. We have used the phenomena of exchange bias to probe this surface alloy is antiferromagnet and its Neel temperature is below the room temperature. A first principles calculation has been applied to explain this various alloy phase and the detailed structures will be presented.