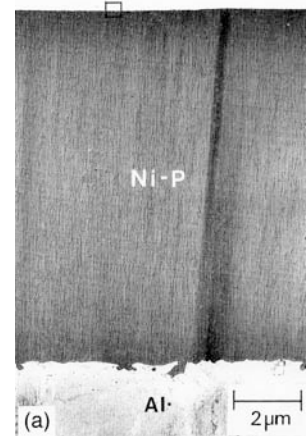
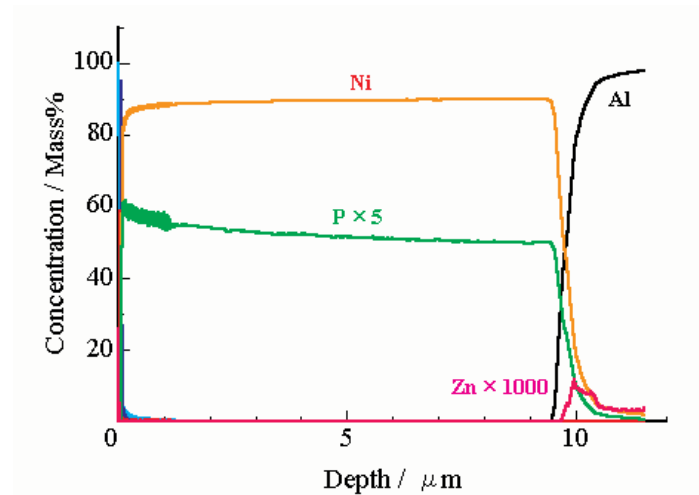


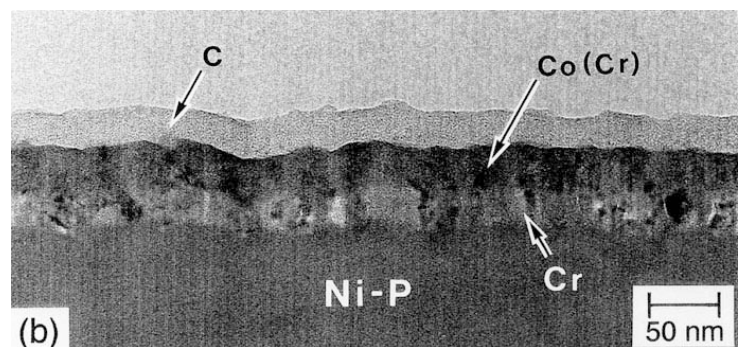
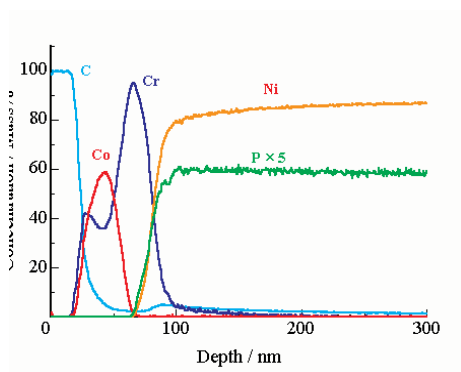
# Analysis of Hard Disk

While RF-GD-OES is new to the surface science world, it is capable of true surface analysis. The speed of RF-GD-OES allows depth profiles of both thin and thick films. The typical sputtering rate in RF-GD-OES is 10-150nm per second representing

30-500 atomic layers per second, but since the counting rates of the patented High Dynamic Detectors (HDD) are very fast the instrument is routinely capable of making 1-10 measurements per element per atomic layer.



The analysis of commercial hard disks is a challenge for most surface techniques, due to the large variations in thickness throughout the layers of the disks. The full-scale depth profile above shows the ability of GD-OES to sputter through the 12μm amorphous Ni-P layer to the Al-Mg substrate in less than 200 seconds (sampling time 0.1 seconds). The transmission electron micrograph images of an ultra-microtomed section of the hard disk confirm the presence of these layers on the disk substrate. At top right, (shown in a), a general view at low magnification.



A zoom of the near-surface region above (left) reveals the lubricant layer, diamond-like carbon protective layer, and the cobalt-chromium magnetic alloy and chromium layers, each approximately 20-30nm thick, which were successively deposited over the disks. Sampling time of the near-surface region was 0.01 seconds. The above right image (shown in b) is a zoom of the near-surface area (shown in the red box in a) at higher magnification.

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