

## Magnetism of ultrathin Fe film grown on GaAs(001) below 120K.

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We study growth kinetics and magnetic properties of ultrathin Fe films grown on GaAs(001) at low temperature (below  $\sim 120\text{K}$ ). We intend such low temperature growth to suppress chemical reactions between Fe and substrate atoms (interface alloying and As-segregation). Through photoemission study using synchrotron radiation, we confirm that the interface alloying is negligible and surface segregation of As is effectively blocked. As a result, chemically abrupt interface is obtained in the low temperature growth. Magnetic properties of these films, whose thickness varies from  $1\text{\AA}$  to  $20\text{\AA}$ , are studied by magnetic-optic Kerr effect (MOKE) and x-ray magnetic circular dichroism (XMCD). Salient magnetic features are observed: the Fe film of  $\sim 1\text{\AA}$  is magnetically alive. For  $3\text{\AA}$  thick Fe film, ferromagnetic order is already observed. Furthermore, the Fe film shows perpendicular magnetic anisotropy (PMA). The spin reorientation transition occurs between  $4\text{\AA}$  and  $5\text{\AA}$  film. For  $5\text{\AA}$  Fe film, the easy axis lies in the sample plane.