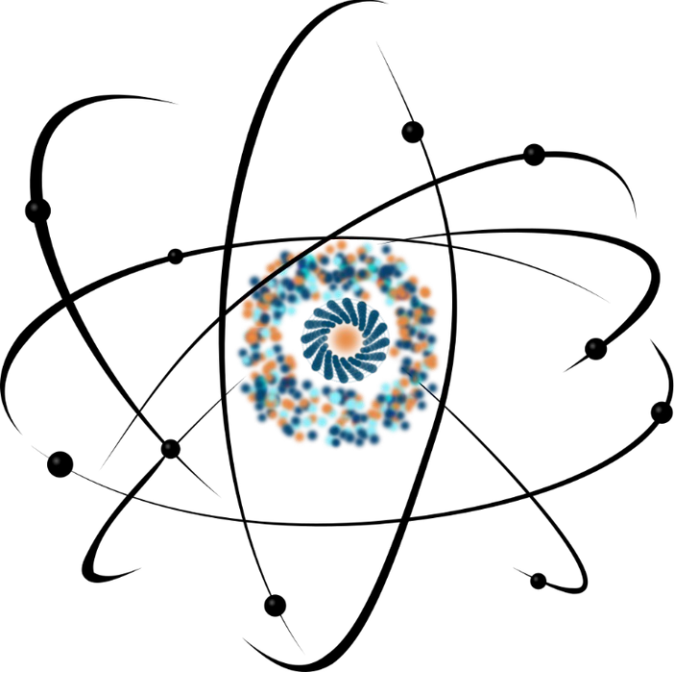




Formation of ordered L1₀ FePt phase in Pt/Ag(Au)/Fe and Fe/Ag(Au)/Pt trilayers



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MOTIVATION

In HAMR (Heat Assisted Magnetic Recording) technology at the manufacture of a medium for magnetic recording it is important to create layers with different magnetic hardness. The intermediate layers are necessary in recording media design because they induce textured growth in the recording layer and improve the exchange decoupling between the magnetic grains.

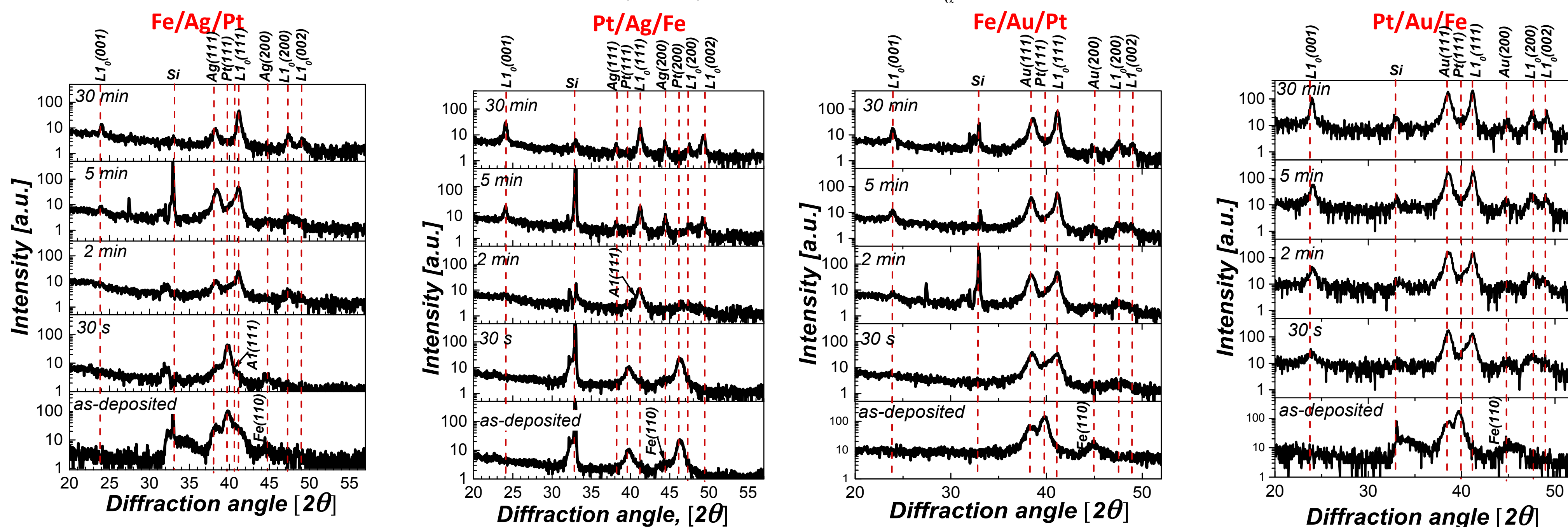
THE AIM

was to investigate the diffusion formation of an ordered L1₀ FePt phase in Pt(15nm)/Ag(Au)/Fe(15 nm) and Fe(15 nm)/Ag(Au)/Pt(15 nm) trilayers with Ag(Au) interlayer thickness of 10 nm.

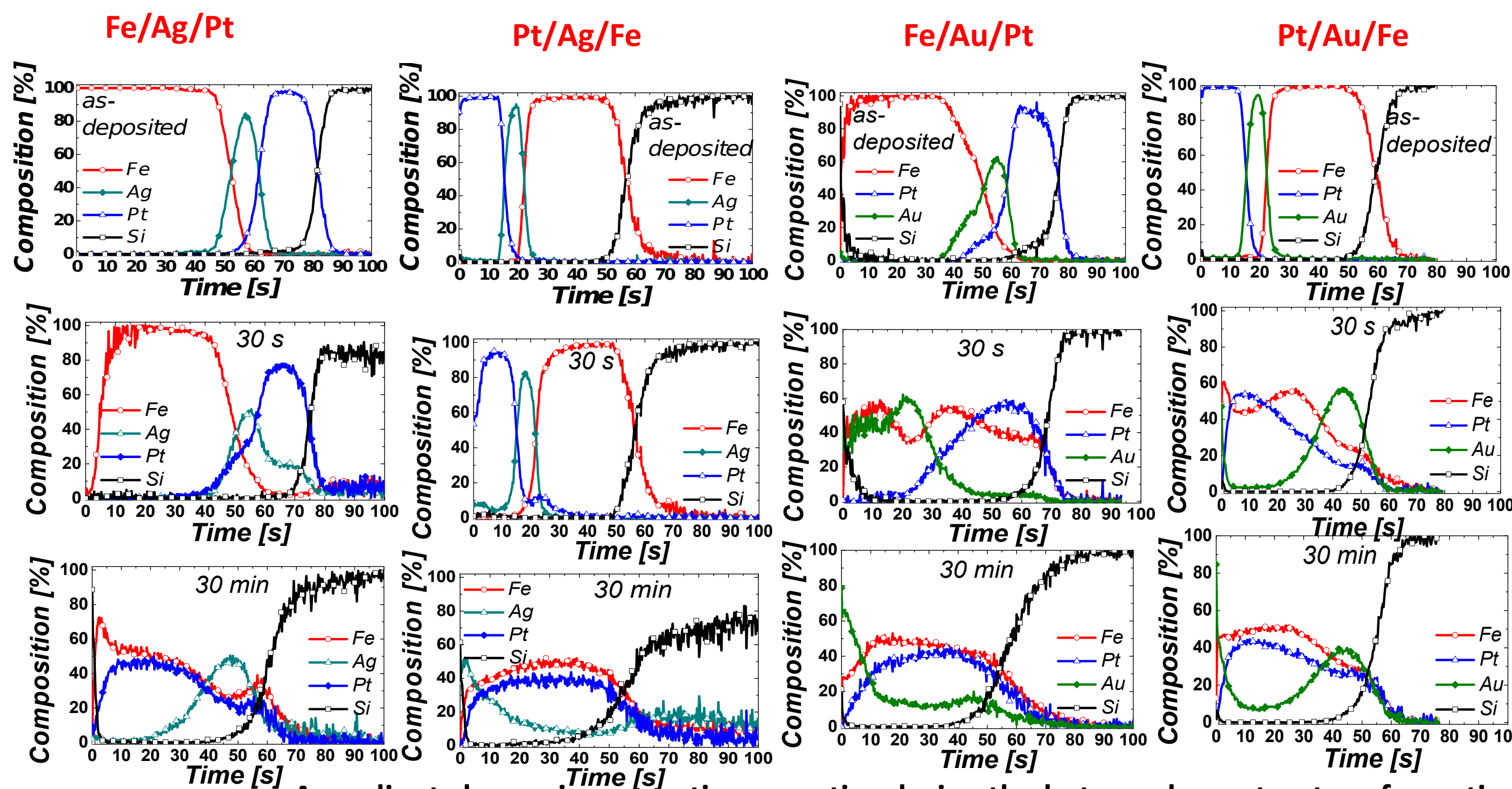
EXPERIMENTAL

The films were prepared by magnetron sputtering on SiO₂/Si(001) substrate. Isothermal annealing of the tri-layered samples were carried out in a vacuum of $1,3 \cdot 10^{-3}$ Pa at temperature of 700 °C for 30 s, 2 min, 5 min, 15 min and 30 min. The structural properties of the as-deposited and annealed films were characterized by X-ray diffraction. Depth profiles of the films were investigated by secondary neutral mass spectrometry. The magnetic properties were determined by a superconducting quantum interference device (SQUID)

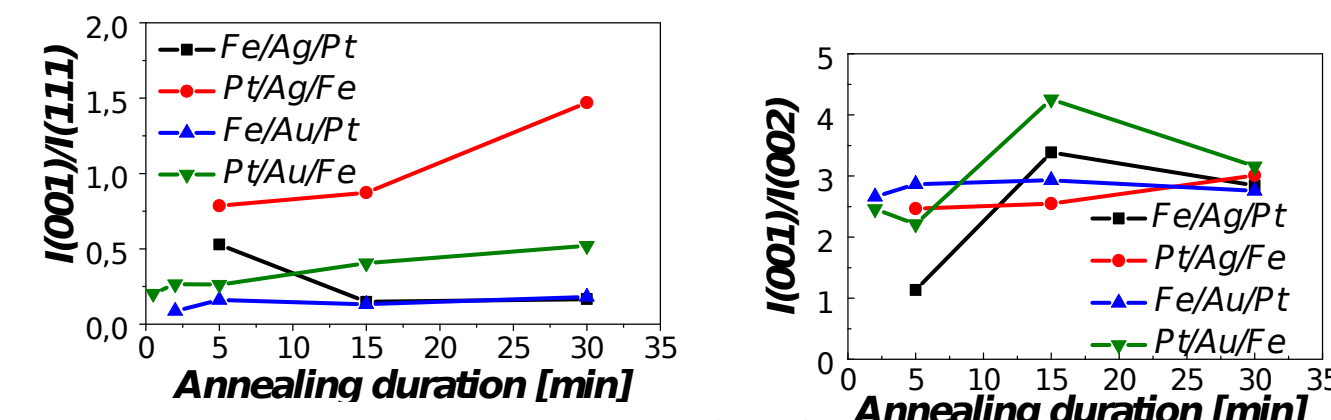
X-ray diffraction patterns (θ -2 θ scans) of as-deposited Fe/Ag(Au)/Pt and Pt/Ag(Au)/Fe films and annealed in vacuum at 700°C for 30 s, 2 min, 5 min and 30 min. Cu K α radiation



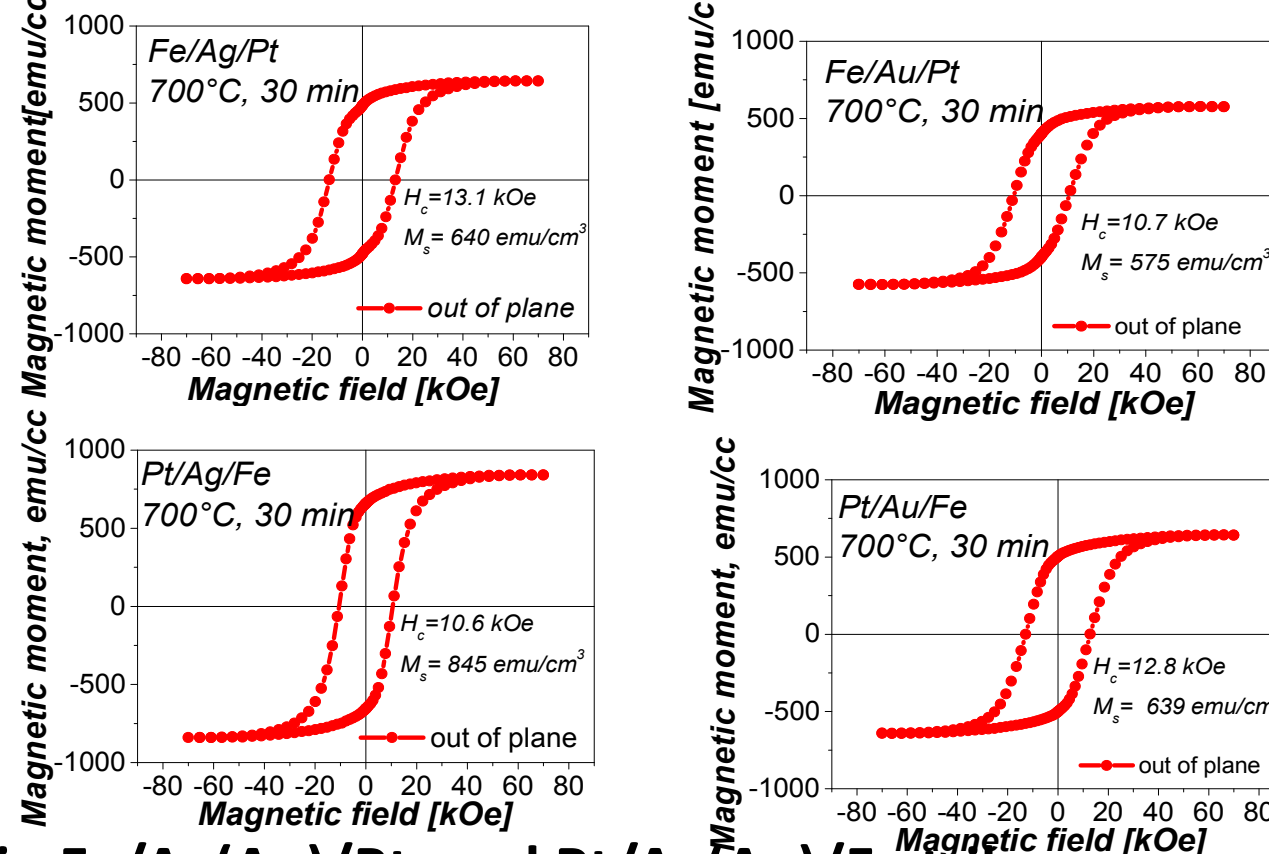
Compositions versus sputtering time profiles of the as-deposited Fe/Ag(Au)/Pt and Pt/Ag(Au)/Fe films and after annealing in vacuum at 700 °C for 30 s – 30 min



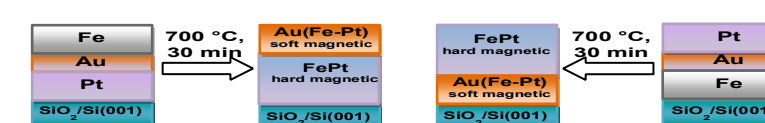
$I(001)/I(111)$ and $I(001)/I(002)$ intensity ratio of ordered L1₀ phase as a function of annealing duration in vacuum at 700°C



M-H hysteresis loops of Fe/Ag/Pt and Pt/Ag/Fe films annealed at 700°C for 2 and 30 min



A gradient change in magnetic properties during the hetero-phase structure formation in Fe/Ag(Au)/Pt and Pt/Ag(Au)/Fe trilayers



CONCLUSIONS

It was found that by changing the sequence of Fe or Pt layers deposition it is possible to form the soft magnetic and hard magnetic layers due to directed Ag(Au) diffusion, creating a heterogeneity of the chemical composition along the film thickness of L1₀ phase formation.

