MATERIALS RESEARCH FACILITIES AT SHARIF UNIVERSITY OF TECHNOLOGY

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Outline

- University introduction
- Materials related labs.
- Materials activities in physics dept.
- Materials main research facilities
- Some very recent published results
- Conclusions

Sharif University of Technology

Sharif University of Technology

- Founded: 1965
- Faculty members: 400 (full time)
- Students: 8000 (2300 MS., 530 PhD.)
- Enrollment: top 2% of eligible candidates in the nation
- Departments (13):
  - Chemistry,
  - Physics,
  - Chemical and Petroleum,
  - Computer,
  - Industrial,
  - Mechanical Engineering,
  - Philosophy of Sciences
  - Mathematical Sciences,
  - Aerospace,
  - Civil,
  - Electrical,
  - Materials Sciences and Engineering
  - Management and Economics,
- Research centers: 28

SUT materials related labs.

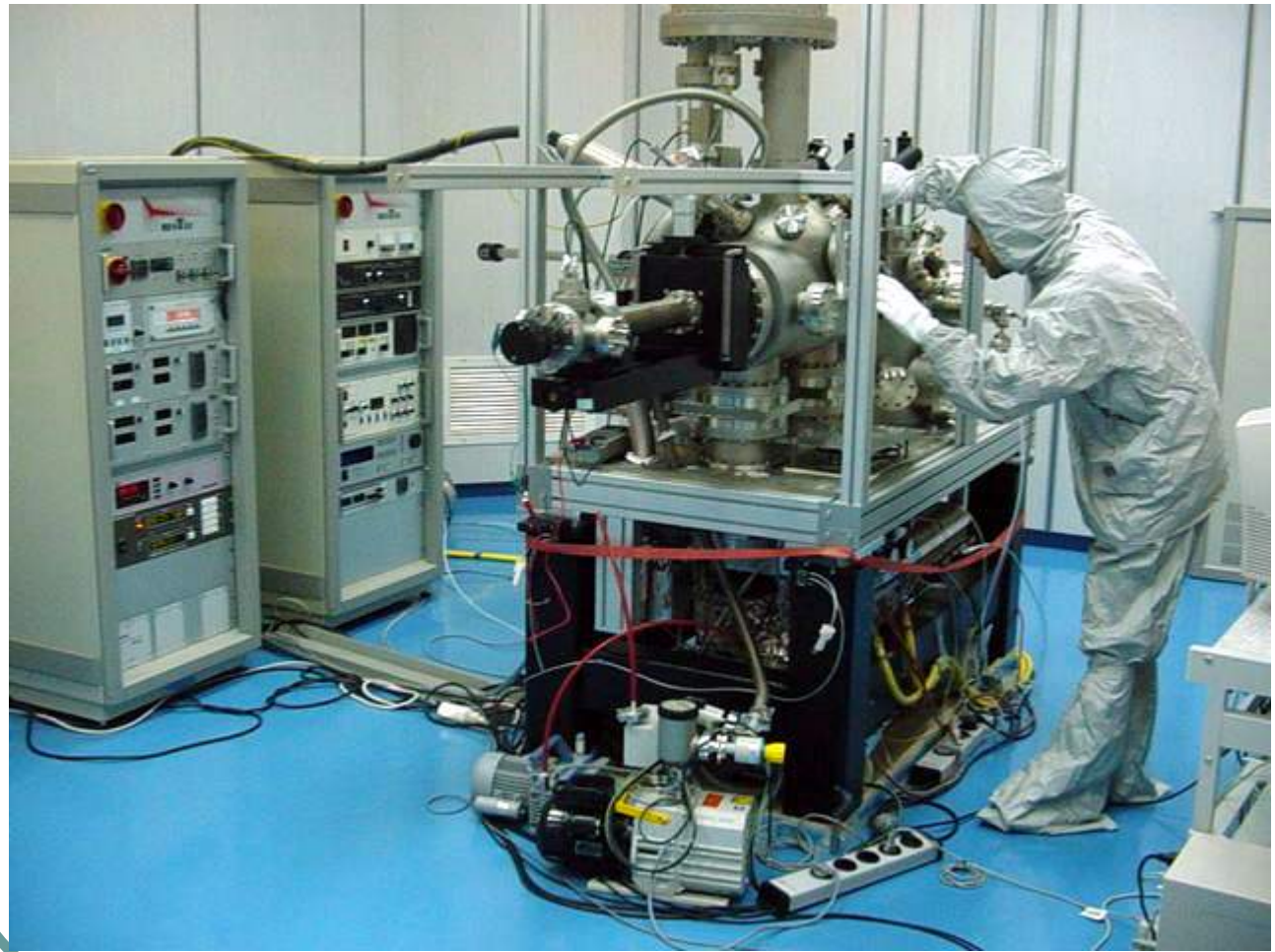
- Surface Physics Lab.
- Sputtering Deposition Lab
- Laser Deposition Lab (2).
- Nano Labs. (3)
- Carbon Lab.
- Magnetic Research Lab.
- Materials Characterization Lab (3).
- Corrosion Lab.
- Semiconductor Device Lab.
- Microelectronics Lab.
- Optics Research Lab. (2)
- Biomaterial Research Lab.
- Chemical Physics Lab. (2)
- Superconducting Research Lab.

Physics Department

Active Materials Research Projects in Physics Department

- Metal nanoparticle synthesis (Ag, Cu, Au)
- Ag metallization
- Ni silicidation
- TiO_2 nanoparticle
- Kinetics and mechanism of catalytic reactions
- Metal oxide gas sensors
- Nanotube, DLC
- HTSC materials
- Laser surface interaction

UHV Surface Analysis System



AES
XPS
UPS
TPD

$(WO_3)_{0.25}$–$(Fe_2O_3)_{0.75}$ thin films

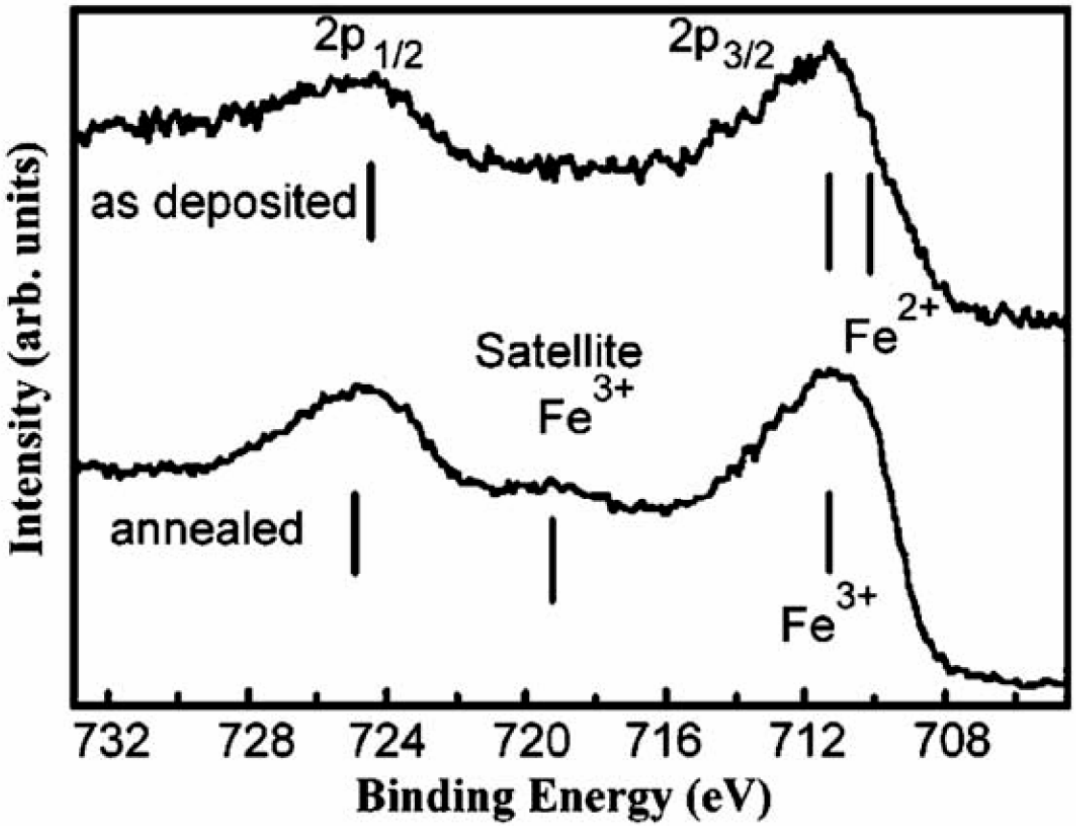


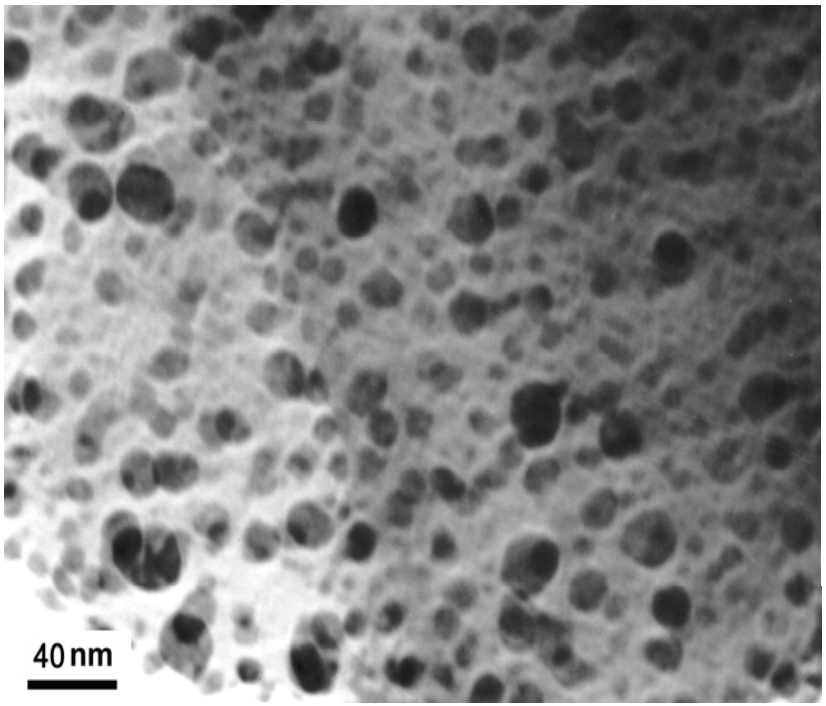
Fig. 9. XPS spectra of the Fe (2p) peaks for the $(WO_3)_{0.25}-(Fe_2O_3)_{0.75}$ thin films: a) "as deposited" and b) annealed.

A.Z. Moshfegh et al. / Thin Solid Films 484 (2005) 124–131

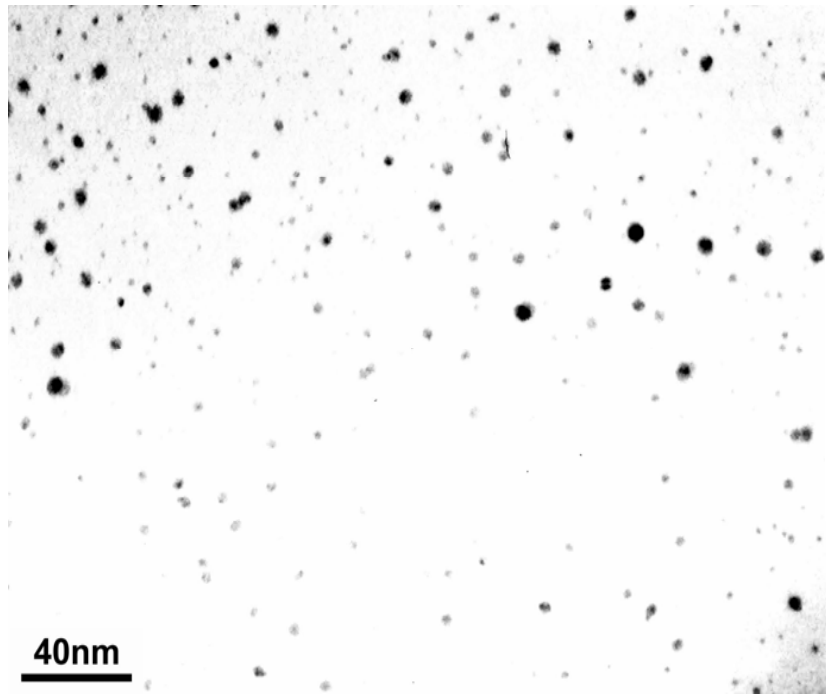
TEM/STEM

Philips CM200 (200 kV)

Sol-gel deposited Ag nanoparticles in SiO_2



Mean particle size: 9 nm



Mean particle size: 5.5 nm

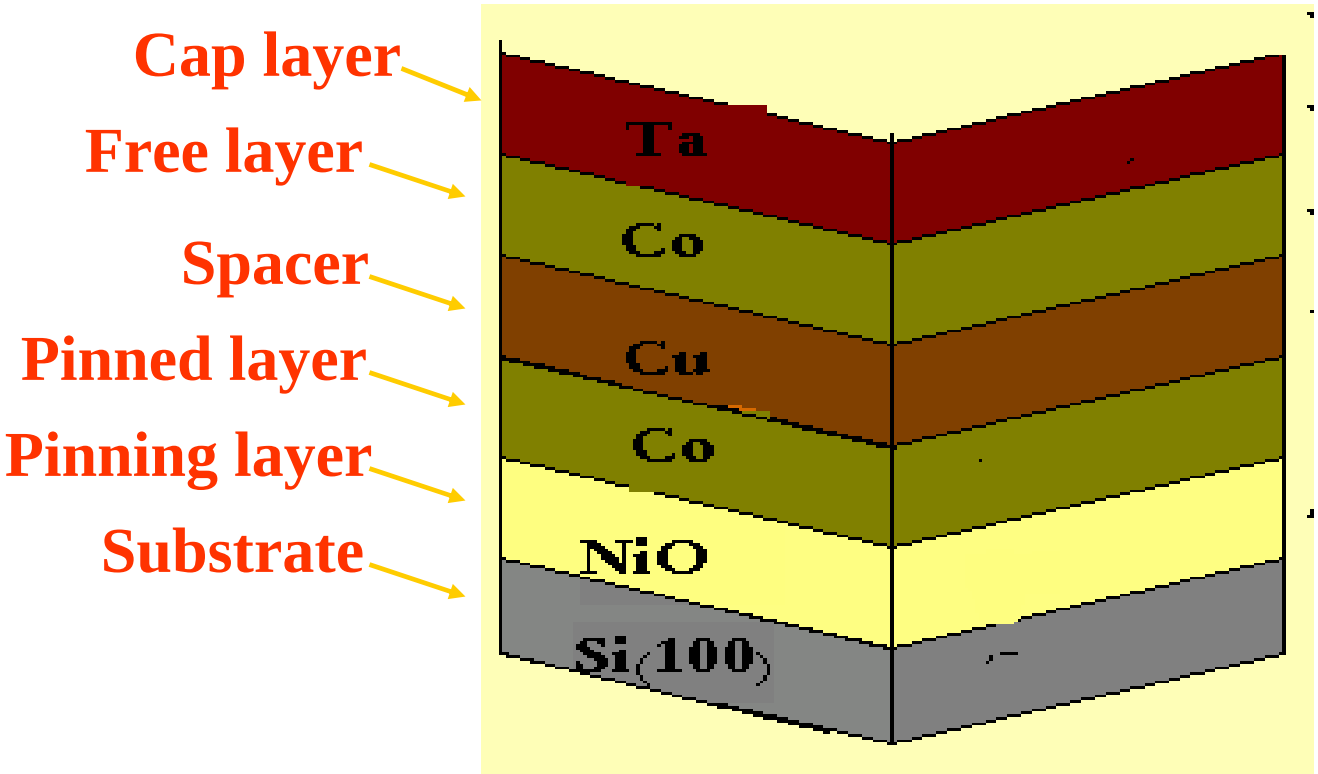
X-ray Diffraction

Philips PW1730

Multi Targets Sputtering-Evaporation System (RF/DC Magnetron)

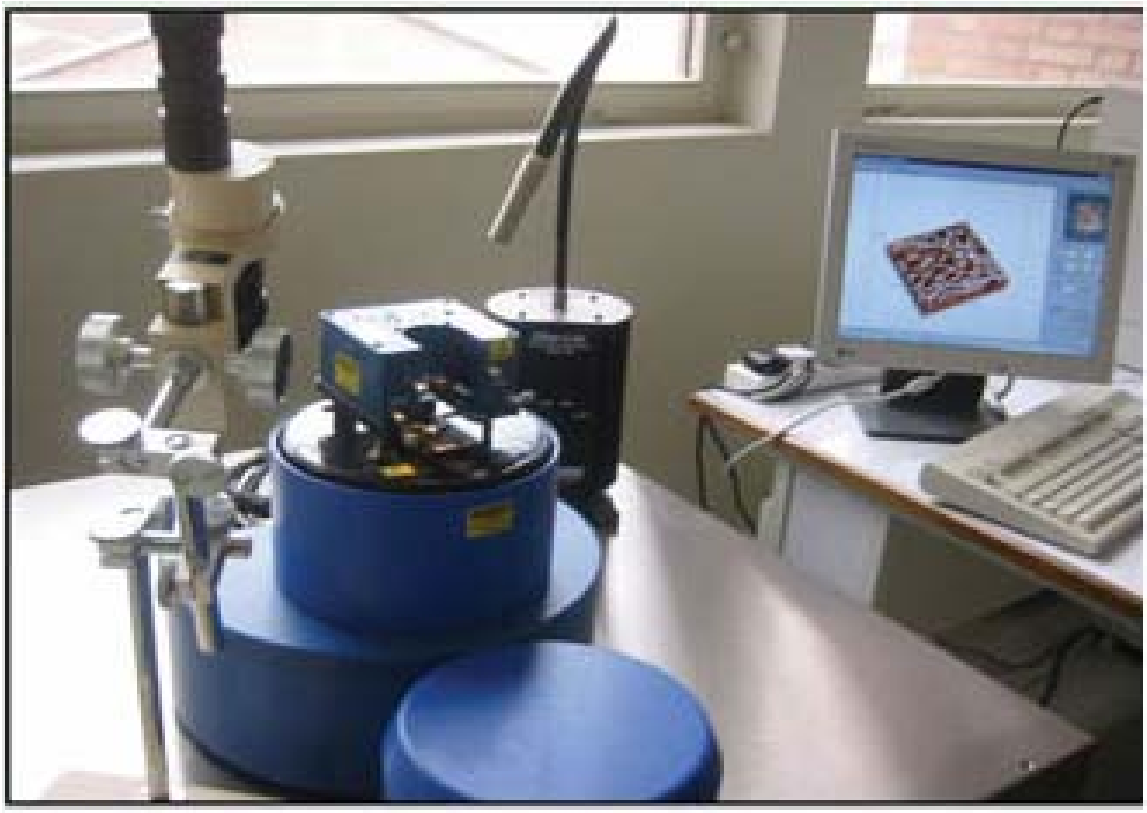
3-four inch targets
2 thermal evaporation sources
Bias/etching
Thickness measurement (QCM)

Magnetic Multilayer Sputtering Deposition



Ta(2nm)/Co/(3nm)/Cu(2nm)/Co(3nm)/NiO(30nm)/Si(100)

Scanning probe microscopy



Contact/noncontact
STM
STS
AFM
MFM

Co(3 nm)/NiO(30 nm)/Si(100) thin films

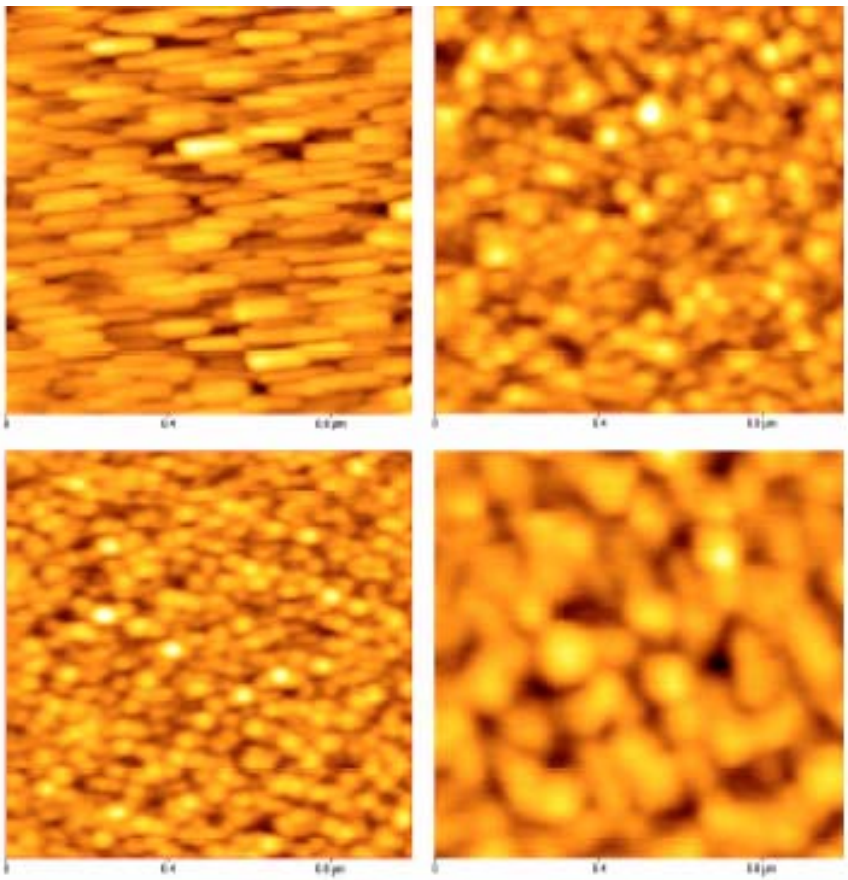


FIG. 1. (Color online) AFM surface images (all $1 \times 1\ \mu m^2$) of Co(3 nm)/NiO(30 nm)/Si(100) thin films deposited at the bias voltages of (a) 0, (b) −20, (c) −40, and (d) −60 V (from top to bottom corresponding *a* to *d*, respectively).

SANGPOUR *et al.* PHYSICAL REVIEW B 71, 155423 (2005)

Pulse laser deposition system

Multi targets
Nd-YAG laser 150 mJ

Vibrating sample magnetometer

2.3 Tesla
Sensitivity: 10^{-3} emu

Fourier Transform Infra-red (FTIR)

Spectral region :
400- 4000 cm^{-1}

Nuclear Magnetic Resonance (NMR)

ADVANCE-DRX
500 MHZ
Magnetic field: superconductor

Gas Chromatography- Mass Spectrometry

Quadruple Mass Analyzer

Atomic Absorption Spectrometer

Conclusions

- A brief introduction of SUT is presented.
- Important materials related facilities in SUT is introduced.
- Important projects on materials research in Physics department is presented.
- Some important very recent published results are shown.
- There is a great potential in SUT for collaboration with other universities in the S.E. Asia.

Thanks for your attention