20th ESCAMPIG

Program of the

20th European Conference on the Atomic and Molecular Physics of Ionized Gases

13 – 17 July 2010, Novi Sad, Serbia

Organized by: Institute of Physics, Belgrade, Serbia

http://www.escampig2010.ipb.ac.rs

XX European Co
and Molecular P

13 - 17

General information

The 20th European Conference on the Atomic and Molecular Physics of Ionized Gases (ESCAMPIG XX) is organized by the Institute of Physics, Belgrade, Serbia. The conference will take place in Novi Sad, Serbia, on July 13-17, 2010, beginning with a welcome reception on Tuesday evening, July the 13th and ending with a workshop on Saturday afternoon, July the 17th.

The ESCAMPIG conference focuses on topics that range from atomic and molecular processes in plasmas and plasma-surface interaction to self-organization in plasmas or to the new research lines with low and high pressure plasma sources. Research in natural plasmas such as space plasmas and the emerging research field of discharge plasmas in the Earth upper atmosphere are also covered.

The International Scientific Committee and the Local Organizing Committee (LOC) invite you to attend the conference and to submit an abstract on your latest scientific achievements.

ESCAMPIG 2014

The ESCAMPIG International Scientific Committee is seeking offers to organize ESCAMPIG 2014. If you are interested in hosting that conference please contact the ISC Chair Bill Graham before the start ESCAMPIG 2010.

Conference Format

The Conference will feature invited general (45 min, including discussion) and topical lectures (30 min, including discussion), poster sessions and two workshops (with one workshop being extended after the end of the conference). Some contributed papers covering relevant issues will be selected by the ISC for the section "Hot Topics" and authors will be asked to give a short oral presentation (15 min including discussion). Contributors wishing to evidence their own paper for "Hot Topics" selection are asked to indicate it in the abstract submission form. There will be no parallel sessions.

"William Crookes" prize is to be awarded to a mid-career researcher who has been judged to have made major contributions in one or more of the areas covered by ESCAMPIG. The prize is co-sponsored by the ESCAMPIG 2010 local committee, the European Physical Society (EPS) and Plasma Sources Science and Technology. The award will be € 1,000 and a diploma along with hotel accommodation and waived fees to attend ESCAMPIG 2010 where the award will be presented. The nomination package should be sent by email to the Chair of the International Scientific Committee W. G. Graham (b.graham@qub.ac.uk) by March the 1st 2010. More information is available here.

Workshops

Two workshops will be organised during ESCAMPIG 2010 and one post conference workshop on Saturday afternoon. The first will deal with atomic and molecular data required to model collisional plasmas and their interaction with surfaces (N. Mason and Z.Lj. Petrovi•). The second will be focused on biological and medical applications of ionized gases (G. Fridman and N. Pua•) and the post conference workshop (N. Mason) will deal with Atomic and Molecular data needs for lighting. More information about workshops is available here.

Last updated on August 5, 2010

Topic number: no.4

Nanolaminated advanced carbon overcoat study by Rutherford backscattering spectroscopy and Monte Carlo ion beam simulation of film growth

B. Tomcik[(1*)], T. Osipowicz[(2)]

[(1)] Institute of Physics, Pregrevica 118-Zemun, POB 57, 1101 Belgrade, Serbia,[(*)] **t**omcik@ipb.ac.rs

[(2)] Physics Department, Blk S12, Faculty of Science, NUS, 2 Science Drive 3, Singapore 117542

Carbon overcoat serves as a mechanical and corrosion protection layer of the hard disk magnetic structure. Its overall thickness should be below 2nm and is usually composed of two layers, a-C:N and a-C:H(N) film. To improve the disk corrosion protective properties, after the magnetic layer deposition a flash layer of carbide forming elements, like Cr or Ti, can be pre-deposited. Now, reactive ion (plasma) beam technologies are mainly used for the carbon overcoat deposition, while DC sputtering is a technique of choice for the under laying structures. To achieve a low nano-scale carbon surface roughness, is necessary to use ions with incident energy up to100 eV/ion, favorably under the grazing incidence angles. Ion beam polishing effect and enhanced surface mobility of ad-atoms during the film growth play an important role for the ultra smooth surface coverage. For the flash layer deposition in thickness below 0.5 nm the filtered cathodic arc technique with metal ion beams has been proposed to replace sputtering.

The hard disk nano-scale film thicknesses require special arrangements during film growth as well as extremely sensitive surface analysis tools in the evaluation of corrosion protection capabilities. For the overall film composition study we used Rutherford backscattering spectroscopy (RBS). For the evaluation of possible interlayer mixing a Monte Carlo simulation was conducted calculating the stopping range of 100 eV incident Cr and C ions in the CoCrPtB magnetic layer.

Magnetic layer ($Co_{80}Cr_{10}Pt_7B_3$, 30 nm) has been sputter deposited over polished Si wafer. A flash layer of Cr (0.5 nm, by FCA method) and a-C:H(N) carbon overcoat were deposited on top of it. Four such samples, 1,2,3,4, have been exposed to corrosion environment (exposure to the vapor of 0.5M HCl solution) for the duration of 21 h, 46.5h, 52h and 284h, respectively. RBS sample composition after the corrosion test has been studied in the *top* arrangement, Fig.1. Taking into account energy positions of the Co, Pt and Cr peaks one may conclude that from the change in the Si edge position, samples 2 and 3 have similar thicknesses of the magnetic layer. The same is applicable for samples 1 and 4. Sample No.3 has some kind of artifact indicating possible segregation due to corrosion induced Co migration to the top. There is no systematic change observable here indicating that corrosion profile is a random event. The change in peak position may be related to the increase of the over layer thickness (everything on top of the magnetic layer) and a cobalt hydroxide/chloride built up.

In order to obtain dense and pinhole-free films there is a need for energetic ion beam bombardment during film growth. With FCA source the flash layer of Cr was deposited at ion energy of 100 eV. The calculated penetration depth of Cr ions into CoCrPtB was always below 0.5 nm. Monte Carlo simulation of the stopping range of ions in material, normally referred to the crystalline solid structures, can be applied for the amorphous solids with short range crystallinity

and at low ion beam incident energies. The calculated Cr (100 eV) ion range into the CoCrPtB magnetic layer was 6Å, 4Å and 3Å for the ion incident angles at 0, 45 and 85 degrees, respectively. Low penetration depth of Cr ions ensures minimization of the thickness of the ñdeath magnetic layerò. The calculated range of C ions into Chromium and into CoCrPtB layer was up to 5Å, Fig.2. Propagation of energetic carbon atoms takes place through cascade processes: displacement collisions, vacancy production, replacement collisions and interstitial atoms.

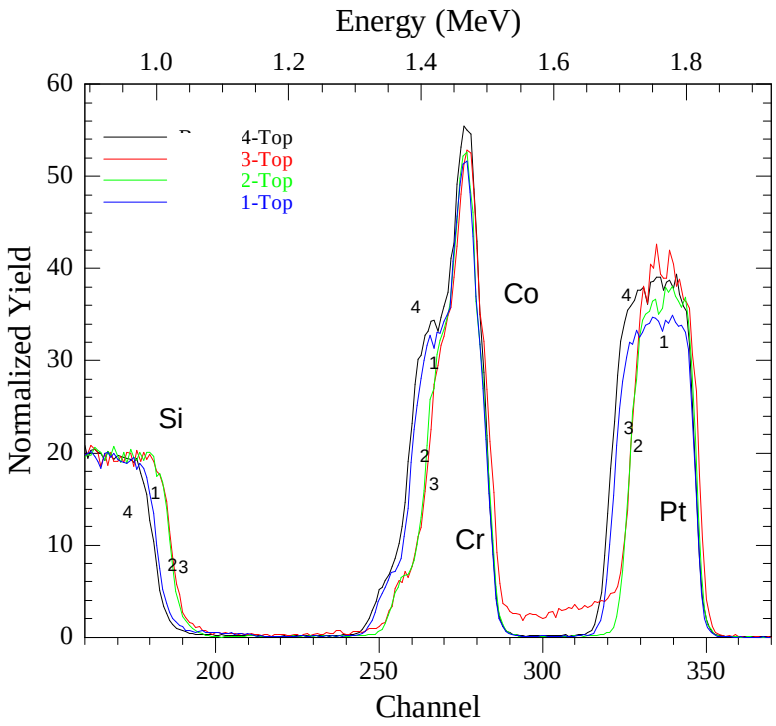

Fig.1. RBS spectra for the corrosion exposed Si/CoCrPtB/Cr/a-C:H samples. Exposure times for samples 1, 2, 3 and 4 were 21h, 46.5h, 52h and 284h, respectively.

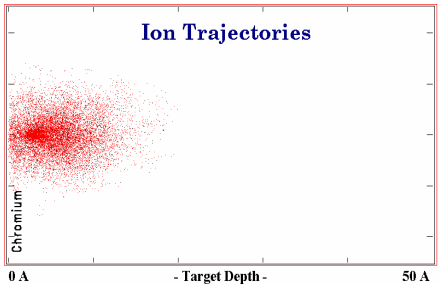

Fig.2. Carbon ion (100 eV) trajectories into Cr.

Reference

[1] B. Tomcik, S.C. Seng, B. Balakrisnan, J.Y. Lee, 2002 *Diamond Rel. Mater.* **11** 1409.

[2] V.Novotny, N. Staud, 1988, *J. Electrochem. Soc. Electrochem. Sci. Technol.* **135** 2931.

[3] B. Tomcik, T. Osipowicz, J.Y. Lee, 2000, *Thin Solid Films* **360** 173.