Himpunan Optika Indonesia (HOI)
Indonesian Optical Society (InOS)

BULETIN HOI

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UNTUK KALANGAN SENDIRI

Buletin HOI adalah media komunikasi antar anggota Himpunan Optika Indonesia (HOI)

Daftar Isi

Pengantar dari Ketua Himpunan Optika Indonesia

Selamat bertemu kembali dalam Buletin Himpunan Optika Indonesia edisi ini.

Dalam Buletin ini, kami laporkan terbitnya sejumlah makalah terseleksi dari hasil riset yang dipresentasikan dalam ISMOA 2013, dalam *Journal of Nonlinear Optical Physics and Materials* (JNOPM) vol. 23 no 1, 2014. Hampir bersamaan telah terbit dalam majalah *Australian Physics* yaitu member's newsletter dari *Australian Institute of Physics* (AIP), artikel yang ditulis oleh perwakilan HOI berjudul *Physics Research in Indonesia – a perspective*.

Salah satu kegiatan penting yang perlu dilaporkan adalah *Workshop* yang telah berlangsung bertema *Optical Conductivity*. Pertemuan ini diseleng-garakan bersama oleh Kelompok Keilmuan Fisika Magnetik dan Fotonik, Institut Teknologi Bandung bersama dengan Department of Physics, National University of Singapore, dari tanggal 9 – 11 Juni 2014. Selain *workshop* ini, pada tanggal 9 - 10 Mei 2014, *Student Branch IEEE Telkom University* mengadakan *The IEEE Shortcourse on Fiber Optics Development*. Sementara itu, berkenaan dengan *International Symposium on Photonics, Optics and Its Applications* 2014 yang akan diselenggarakan di Bali pada 14-15 Oktober 2014, redaksi juga menerima sebuah berita dari Panitia Penyelenggara pertemuan tersebut.

Pada tanggal 21 Mei 2014 yang lalu, Prof. Dr. Andrianto Handoyo, guru besar ITB dalam bidang optik, telah wafat. Sebuah obituari mengenang beliau juga tersaji dalam Buletin ini.

Seperti yang tertuang dalam Anggaran Dasar Himpunan Optika Indonesia, tujuan dari organisasi yang pertama adalah mendukung perkembangan ilmu pengetahuan dan teknologi dalam bidang optika serta menyebarluaskan informasi yang terkait kepada masyarakat Indonesia. Dan tujuan kedua adalah mengembangkan budaya riset dalam bidang optika dan menyediakan forum interaksi ilmiah antar peneliti, antara kalangan akademisi dan industri serta pemerintah, untuk menumbuhkan dukungan kerjasama riset yang dapat menjadi cikal bakal daya saing bangsa dalam bidang industri fotonik.

Sebagai media komunikasi antar Anggota, Buletin ini juga dimanfaatkan untuk memuat berita perkembangan mutahir dalam ilmu dan teknologi fotonika maupun hasil riset kelompok riset dalam bidang fotonika dari perguruan tinggi dan lembaga riset di Indonesia. Untuk tujuan tersebut, Himpunan mendorong para Anggotanya untuk dapat melaporkan secara ringkas hasil karya terbarunya, terutama yang sudah diterbitkan dalam jurnal internasional seperti yang dimuat dalam Buletin ini.

Kami tunggu kontribusi dari para Anggota Himpunan dalam edisi-edisi selanjutnya.

Selamat membaca!

Alexander A. Iskandar

Himpunan Optika Indonesia menerima sumbangan berita yang berkaitan dengan optika dari para anggota untuk dimuat pada Buletin HOI. Informasi tersebut dapat dikirimkan ke:

InOS@IndonesianOptics.org

Diterbitkan oleh
Himpunan Optika Indonesia (HOI)

Penanggung Jawab
Alexander A. Iskandar

Pimpinan Redaksi
Henri P. Uranus

Anggota
Fitrilawati, Husin Alatas

Penerbitan Makalah Terseleksi dari ISMOA 2013 di JNOPM

Seperti yang telah dilaporkan pada edisi Buletin HOI yang lalu, telah diseleksi delapan buah artikel dari pertemuan 9th *International Symposium on Modern Optics and Its Applications* (ISMOA) 2013 yang lalu untuk diterbitkan dalam *Journal of Nonlinear Optical Physics and Materials* (JNOPM). Artikel-artikel ini telah terbit dalam satu edisi dari jurnal tersebut, vol. 23 issue 1 (2014) (http://www.worldscientific.com/toc/jnopm/23/01).

1st Workshop on Condensed Matter Physics: Optical Conductivity of Functional Materials

The Physics of Magnetism and Photonics, Institut Teknologi Bandung (ITB) and the Functional Materials and Devices research group, National University of Singapore (NUS) had organized a workshop on Optical Conductivity of Functional Materials from 9 to 11 June 2014 at the Physics Department, Institut Teknologi Bandung. The organizers are: A. A. Nugroho (ITB) and A. Rusydi (NUS-ITB)

M.O. Tjia, lecturers A. Rusydi, Y. Darma and M.A. Majidi (front row from right to left) and students attending the workshop.

The interaction between light and matter has provided a great opportunity to explore the fundamental properties of the material as well as the possibilities to control its functionality. The workshop consists of three days lecture and tutorial. The lecture covered the basic interaction between light and matter, the basic theory of optical conductivity, the electronic structure of solids and molecules, the principle of scattering and various related spectroscopies such as ellipsometry, angular-resolved photoemission, reflectivity, luminescence and fluorescence. The workshop was aimed to explore and stimulate a scientific cooperation between Indonesian institutions and Singapore Light Source Facility on magnetic and other functional materials, therefore, several recent progress have been presented in the lecture: graphene, dilute magnetic semiconductor and mixed valence magnetic oxides. These lectures and tutorials were delivered by A. Agung Nugroho (ITB), Andrivo Rusydi (NUS-ITB), M. Aziz Majidi (UI), Daniel Schmidt (NUS), Teguh C. Asmara (NUS), Paolo E. Trevisanuto (NUS), Pranjal K. Gogoi (NUS), Yudi Darma (ITB), Rahmat Hidayat (ITB) and Iman Santoso (UGM). Around 50 participants consisting of students and researchers of UI, UNPAD, UGM, LIPI, Telkom University and ITB attended the Workshop.

Andrivo Rusydi from NUS-ITB delivering his lecture.

Pelatihan Serat Optik di *Telkom University*

Pada hari Jum'at - Sabtu, tanggal 9 - 10 Mei 2014, *Student Branch IEEE* (*The Institute of Electrical and Electronics Engineers*) *Telkom University* meng-adakan "The IEEE Shortcourse on Fiber Optics Development" di kampus *Telkom University*, Bandung. pelatihan selama 2 hari tersebut diikuti oleh sekitar 100 peserta yang terdiri dari mahasiswa-mahasiswa dari *Telkom University*, ITB, dan Polman Bandung. Pelatihan tersebut diisi pengenalan fiber optik, kunjungan lapangan, praktek penyambungan dan pengukuran, serta perkembangan terbaru jenis dan aplikasi fiber optik seperti DWDM (*dense wavelength division multiplexing*) dan PON (*passive optical network*).

Pada kesempatan tersebut Henri Uranus, Anggota HOI, menyampaikan materi mengenai *Photonic*

Crystal Fiber (PCF), suatu *specialty fiber* yang tidak membutuhkan *doping* dan prinsip pemantulan internal total dalam operasinya. Pada sesi berjudul "Photonic Crystal Fibers: For Telecom and Beyond" tersebut, selain prinsip kerja dan perbandingan dengan fiber optik konvensional, juga dibahas contoh-contoh aplikasi PCF untuk keperluan telekomunikasi (seperti kompensasi dispersi, transmisi, sumber cahaya berpanjang gelombang banyak dalam *grid* ITU untuk DWDM) dan aplikasi lain di luar telekomunikasi (seperti pisau bedah laser dan sensor).

International Seminar on Photonics, Optics and Its Applications 2014

Laboratorium Teknik Fotonik dari Jurusan Teknik Fisika, Institut Teknologi Sepuluh Nopember, Surabaya, akan menyelenggarakan *International Seminar on Photonics, Optics and Its Applications* (ISPhOA 2014) pada tanggal 14-15 Oktober 2014 di Sanur, Bali. Pertemuan ilmiah yang akan dilaksanakan ini telah mendapatkan dukungan (*endorsement*) HOI dan Anggota HOI yang ingin berpartisipasi dalam pertemuan ini akan dapat menikmati potongan biaya keikutsertaan sebesar 50% dengan menunjukkan kartu Anggota yang berlaku untuk tahun 2014. Makalah yang diterima akan muncul di Proceeding SPIE (http://spie.org/x1848.xml) yang akan muncul di SPIE *Digital Library*. Makalah-makalah terpilih akan diundang untuk memasukkan versi *extended*-nya ke *Journal of Optics*.Berikut adalah pesan dari Panitia Penyelenggara.

> Melalui kesempatan ini, ijinkan kami dari Panitia Pelaksana kegiatan International Seminar on Photonics, Optics, and its Applications (ISPhOA 2014) untuk menyampaikan undangan Call for Paper terkait penyelenggaraan kegiatan ISPhOA 2014. Forum ilmiah ini direncanakan akan diselenggarakan pada tanggal 14 - 15 Oktober 2014, di Sanur Paradise Plaza Hotel, Sanur Bali.
>
> Kami mengundang Bapak / Ibu peneliti serta anggota Perhimpunan Optika Indonesia (InOS) beserta seluruh kolega terkait di lingkungan lembaga Bapak / Ibu, untuk dapat menyampaikan paparan kertas kerja hasil-hasil penelitiannya dibidang keilmuan Optika dan Fotonika.
>
> Informasi selengkapnya terkait kegiatan tersebut dapat dilihat dalam tautan http://www.isphoa2014.org/
>
> Besar harapan kami atas kontribusi aktif dari Bapak/Ibu dalam acara tersebut. Atas nama panitia penyelenggara, kami ucapkan banyak terima kasih atas perhatian dan kontribusi aktif yang diberikan.
>
> Hormat kami,
> Dr.rer.nat. Aulia Nasution
> Chair of Organizing Committee ISPhOA 2014
> isphoa2014@ep.its.ac.id

Obituari

Pada Rabu, 21 Mei 2014, pukul 12:50 WIB, komunitas optika di Indonesia kehilangan salah satu tokoh optika Indonesia. Prof. Dr. Andrianto Handojo yang telah kembali ke pangkuan Maha Pencipta di RS. Dharmais, Jakarta dan dimakamkan di Pemakaman Kristen Pandu, Bandung pada keesokan harinya, Tgl. 22 Mei 2014.

Pak Andrianto, begitu beliau biasa disapa, memperoleh gelar Dr. dari TU Delft pada 1979, dan mengajar pada Program Studi Teknik Fisika ITB sejak tahun 1980, serta menjadi guru besar untuk bidang keahlian optika sejak tahun 1999. Selain di ITB, almarhum juga terlibat mengajar di Program Pascasarjana UI di Program Studi Opto Elektroteknika dan Aplikasi Laser. Beliau terkenal sebagai dosen yang inspiratif dan mampu membuat materi kuliah yang sulit menjadi menarik dan mudah dimengerti. Prof. Andrianto Handojo adalah Ketua Dewan Riset Nasional (DRN) untuk 2 masa jabatan, yaitu 2008 – 2012 dan 2012 -2014. Beliau adalah juga satu-satunya anggota yang mewakili Indonesia di International Commission of Optics (ICO) sejak 1987. Beberapa karya ilmiah beliau antara lain "Imaging through scattering media with the double aperture set-up" (Opt. Laser Technol., 2001), "Testing aspheric surfaces: Simple method with a circular stop" (Appl. Opt., 1998), dan "Colour image recording using thermoplastic photoconductor material" (Opt. Commun., 1987). Segenap pengurus Himpunan Optika Indonesia mengucapkan belasungkawa yang mendalam dan turut merasa kehilangan. Semoga Tuhan yang Maha Pengasih memberikan kekuatan dan penghiburan kepada keluarga yang ditinggalkannya.

Physics Research in Indonesia – a perspective

M.O. Tjia and Alexander A. Iskandar
Fisika Magnetik dan Fotonik, Institut Teknologi Bandung

excerpt from *Australian Physics* **51**(2) (Mar–Apr 2014) p 47-51.

This article provides a perspective on the range of physics research activities in Indonesia, at universities and government institutions. Some of the difficulties of achieving internationally competitive results are discussed and the importance of international collaborations are highlighted. Contact details are provided for those who might be interested in establishing contacts with Indonesian physicists.

Physics research in Indonesia has so far been conducted in a limited number of universities and research institutions. The research areas are relatively spread out ranging from fundamental theoretical physics to experimental studies on functional materials and laser spectroscopy as well as numerical studies and modeling of photonic devices. The individual research groups vary largely in size, and collaborations among members of different groups are not uncommon. While the number of officially funded research projects is quite large (close to 500 in total), outputs vary considerably in quality. Most of the more credible research activities, which are relatively small in number, are carried out in collaboration with researchers or research groups of international standing abroad and involve, in many cases, Indonesian graduate students. Only a limited number of the research results have been published in peer-reviewed international journals.

The relatively small number of active researchers, in spite of the large number (close to ten thousand) of PhD graduates with reasonable research training background, is mainly the consequence of a lack of focused and consistent support from government and the practically nonexistent industry support for R & D. As a result, research infrastructures and facilities, as well as research funding, are far from adequate for quality research, especially in the area of experimental research. This is not to say that research funding is unavailable in this country. In fact Indonesian research scientists may seek support via several competitive research grant schemes run by the Ministry of Education and Culture, the Ministry for Research and Technology and some universities. Unfortunately the amounts of money offered by these funding schemes are generally not available for capital expenditure or even for purchasing small instruments. Furthermore, most of the funding schemes are only offered for single year projects. Furthermore, in most cases, 40% of the project money is earmarked for salaries of researchers.

So far, only a few Indonesian researchers have been involved in international research collaborations and have received substantial funding from international agencies, such as the Royal Dutch Academy of Arts and Sciences (KNAW) and the Abdus Salam International Centre for Theoretical Physics (ICTP). Most experimental research has been carried out in much better equipped laboratories abroad.

Given the relatively bleak overall picture of physics research in Indonesia, it is nevertheless worthwhile to present a brief account of the activities of some active research groups, which may serve as the seeds for more vibrant research activities for the country in the future. We shall briefly describe those research activities of international significance. It goes without saying that the cursory information given here is a personal perspective, limited by our contacts and familiarity with the research groups and it is not unlikely that we may have inadvertently left out some groups and their work; for this we offer our sincere apology.

Laporan Singkat Hasil Riset Anggota HOI

Dynamics of photo-excited electrons in magnetically ordered $TbMnO_3$

I P Handayani, R I Tobey, J Janusonis, D A Mazurenko, N Mufti, A A Nugroho, M O Tjia, T T M Palstra, and P H M van Loosdrecht
J. Phys.: Condens. Matter **25** (2013) 116007
doi:10.1088/0953-8984/25/11/116007

Keywords: transient reflectivity, TbMnO3, photoexcited electron, magnon assisted hopping.

$TbMnO_3$ is a multiferroic compound with strong $GeFeO_3$ type distortion. This structural distortion leads to frustration of the manganese spin degree of freedom due to strong competition between nearest neighbor and next nearest neighbor magnetic interactions. As a consequence, the ferromagnetic interaction along the a-axis decreases and a sinusoidal antiferromagnetic spin structure is formed

along the b-direction at the Néel temperature, $T_{N,1}$ of 41 K. Below $T_{N,2}$ of 26 K, the magnetic structure changes to a *bc*-cycloid with the concurrent appearance of the spontaneous electric polarization along the *c*-axis. The optical property of $TbMnO_3$ is characterized by an optical spectrum centered around 2 eV which is associated with intersite *d*-*d* transitions and is strongly coupled to the magnetic orderings in the system. In this study, time resolved optical spectroscopy is used to elucidate the dynamics of photodoped spin-aligned carriers in the presence of an underlying magnetic lattice in $TbMnO_3$. The transient responses while probing *d*–*d* intersite transitions show marked differences along different crystallographic directions, which are discussed in terms of the interplay between the processes of hopping of the photo-injected electrons and the magnetic order in the material.

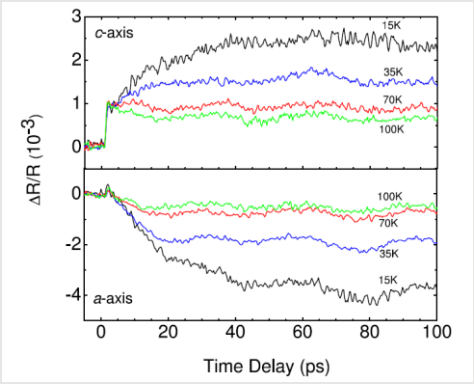

Figure 1. The temperature dependent transient responses in $TbMnO_3$. The increasing of reflectivity is observed along *c*-axis marked by the negative transient responses while the decreasing of reflectivity along *a*-axis is marked by the positive transient reflectivity

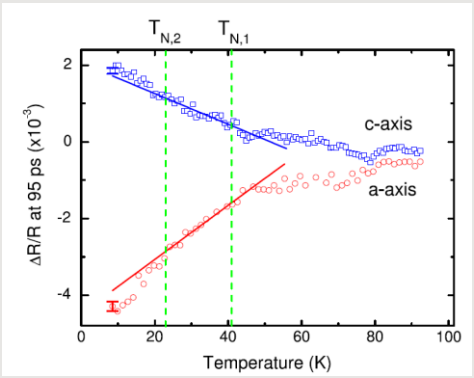

Figure 2. The temperature dependent change of the transient reflectivity amplitude observed at 95 ps after photoexcitations. A significant change is observed at $T_{N,1}$. The linear fits between $T_{N,2} < T < T_{N,1}$ are made to accentuate the effects of magnetic ordering.

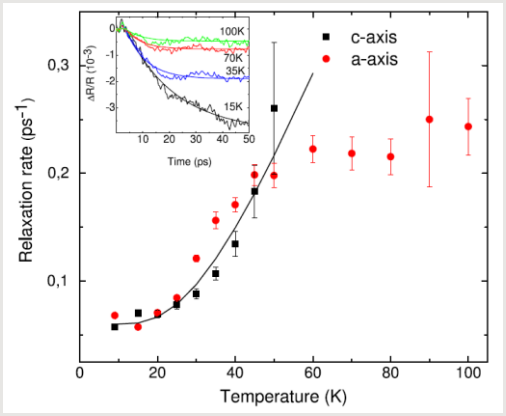

Figure 3. The relaxation time of transient reflectivity. A remarkable decrease below $T_{N,1}$ signifies the role of magnon as an alternative decay channel for the relaxation of photoexcited electrons. Fitting this time constant to a Bose–Einstein distribution for the number of magnons at temperature *T*, a characteristic energy of 8 meV is obtained, well matched to the near zone boundary magnon energy.

Enhanced Energy Confinement Induced by Metallic Coating of Central Rod in Square Array Photonic Crystal of Dielectric Rods for TM Light

R.N.S. Suryadharma, A.A. Iskandar and M.O. Tjia
J. Opt. **16** (2014) 075102
doi:10.1088/2040-8978/16/7/075102

Keywords: photonic crystals, photonic band structure, photonic crystal cavities
PACS numbers: 42.60.Da, 42.70.Qs

We study the effects of a defect created by metallic coating of the central rod in a square lattice of dielectric rods for TM polarization lights. A calculation using the Plane Wave Expansion Method (PWE) in the supercell model shows that the photonic band structure and field distribution in the defect area varies with changing metallic layer thickness. The optimal energy localization is explored by varying the thickness of the metal layer. Enhancement of the energy confinement is described by the narrower spatial distribution profile of the energy with thicker metal coating.

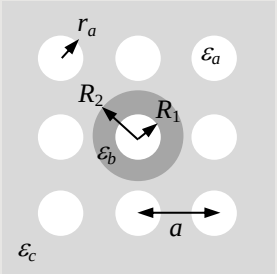

Figure 1. PC of dielectric rods with a single defect created by metal coating of the central rod.

A more quantitative description, given in terms of confinement quality (CQ) defined by the normalized integrated intensity in the central rod, exhibits monotonous increase of CQ with growing metal layer thickness. The highest CQ value achieved is around 80% for a 3 × 3 supercell, which is considerably higher than the 44% optimal value achievable in the same dielectric PC structure with a defective central rod.

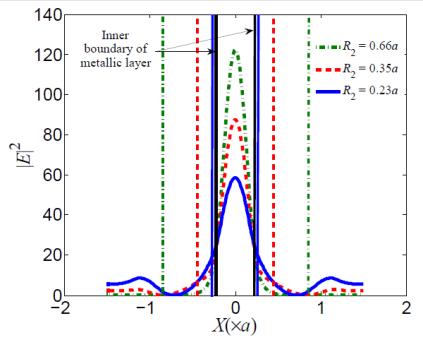

Figure 2. Cross section of the spatial electric field ($|E|^2$) distributions calculated for different R_2 and the associated metal layer boundaries.

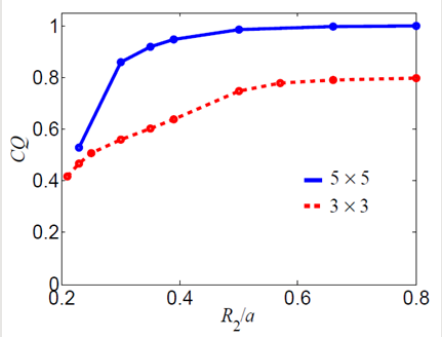

Figure 3. Electric field amplitudes at the defect center (solid line) and at the inner boundary of metallic coating (dashed line) for various R_2.

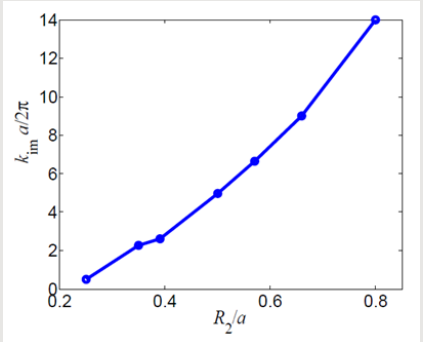

Figure 4. Variation of k_{im} with respect to R_2 for 3 × 3 supercell.

Further calculation using the Extended Plane Wave Expansion Method for determining the imaginary part of the Bloch wave vector (k_{im}) shows increasing k_{im} with increasing metal coating thickness. The following analysis explains and corroborates the enhanced energy confinement effect.

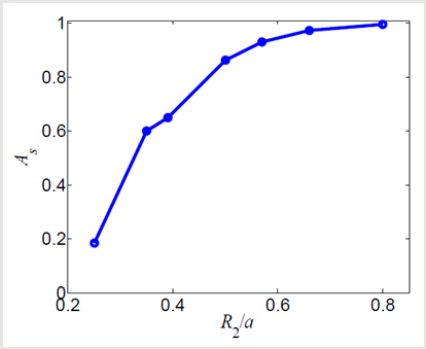

Figure 5. Variation of amplitude suppression factor (A_s = 1 – exp[-2$k_{im}x_b/2\pi$]) with respect to R_2 for 3 × 3 supercell.

Berita Anggota

Iuran Anggota tahun 2014

Dengan berakhirnya masa berlakunya kartu Anggota HOI pada tahun 2013, maka perlu diterbitkan kartu Anggota yang baru. Untuk itu semua Anggota HOI diharapkan melunasi iuran Anggota yang berdasarkan ketentuan Majelis HOI, seorang Anggota Penuh diwajibkan untuk melunasi iuran tahunan sebesar Rp. 300.000,- (tiga ratus ribu rupiah) dan Rp. 100.000,- bagi Anggota Muda. Iuran Anggota tersebut dapat ditransfer ke rekening HOI dengan data sebagai berikut :

Bank : BCA, KCU Mangga Dua Raya, Jakarta
Nama Rekening : Himpunan Optika Indonesia
Nomor Rekening : 335 3333336

Setelah Bendahara melaporkan diterimanya pembayaran iuran Anggota tahun 2014 tersebut, kartu Anggota akan dicetak dan dikirimkan ke alamat masing-masing Anggota yang telah membayar. Untuk membantu mempercepat pencatatan penerimaan iuran Anggota tahun 2014 ini, mohon para Anggota yang telah membayar iuran ini mengirimkan bukti pembayaran ke alamat email HOI (inos@indonesianoptics.org).