


13th July 2011

Telephone: (+44) (0)1904 322289
Fax: (+44) (0)1904 322247
E.mail: kevin.ogrady@york.ac.uk

Certificate of Attendance

I am pleased to confirm that Tariq F Alhuwaymel attended the JSPS York-Tohoku Research Symposium on Magnetic Materials and Spintronics from Monday the 27th June to Wednesday the 29th June 2011 and presented a poster on Monday the 27th June.



Kevin O'Grady
Professor of Experimental Physics



Dear Sir/Madam,

I hereby confirm that Mr. Tariq Alhuwaymel has attended workshop *Research in Magnetism 2011* held in Durham on 21st September 2011 and presented a poster titled '*Development of a New Characterisation Technique for Half-Metallic Ferromagnetic Ultrathin Films*'.

*'Current
and
Technique for*

Yours sincerely,

Dr. Erhan Arac
Research Associate

Durham University
Department of Physics
DH1 3LE
United Kingdom



Tel: +44 (0) 191 33 43655
E-mail: erhan.arac@durham.ac.uk

THE UNIVERSITY *of* York

DEPARTMENT OF
COMPUTER SCIENCE
Deramore Lane, York YO10 5GH

Mike Dodds
Anniversary Research Lecturer
Research Student Training Officer
Telephone: 01904 325 444
Fax: 01904 325599
Email: mike.dodds@york.ac.uk
Web: <http://www.cs.york.ac.uk/>

2013-06-24



To whom it may concern,

Re: YDS 2012

The goal of the YDS series is to bring together doctoral students from around the UK and Europe to share and exchange their research and ideas with others. The hope is that by bringing students together from a wide range of areas, we can promote interdisciplinary research, as well as allow doctoral students to gain experience presenting their work to colleagues. The symposia are organised entirely by PhD students at the University of York.

Yours sincerely

A handwritten signature in black ink, appearing to read "Mike Dodds". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Mike Dodds



IEEE International Magnetism Conference

Dresden, Germany

May 4-8, 2014



Name *Tariq Alhuwaymel*
Address *18 Pinelands Way*
York
YO10 3QJ

Dresden, May 8, 2014

IEEE International Magnetism Conference 2014 - Attendance confirmation

To whom it may concern,

Hereby it is confirmed, that

Tariq Alhuwaymel (Department of Electronics, University of York)
York, YO10 5DD, UK

Name, Affiliation

has attended INTERMAG 2014 from 4 to 8 of May, 2014, in Dresden Germany, and presented a talk/poster entitled

New band-gap measurement technique for a half-metallic
Ferromagnet

Presentation Title

Sincerely,

INTERMAG 2014
Dresden, May 4-8

Dr. Heike Schlörb

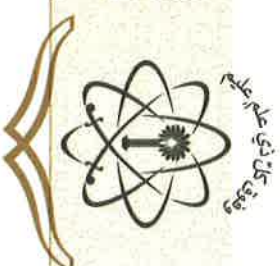
Intermag 2014 Management Committee



مؤتمر الطلبة السعوديين في المملكة المتحدة
Saudi Students Conference - UK

Presenter Certificate

وزارة التعليم العالي
MINISTRY OF HIGHER EDUCATION
المملكة العربية السعودية في لندن
ROYAL EMBASSY OF SAUDI ARABIA - CULTURAL BUREAU - LONDON



With sincere thanks and appreciation extended for

the valuable contribution of

Tariq Alhuwaymel

In the seventh Saudi Students Conference (SSC2014)

that was held at Edinburgh International Conference Centre (EICC),

Edinburgh, the United Kingdom

1st – 2nd of February 2014



Universities
Scotland



Mr. Khalid Thamer Althagafy

SSC Scientific Committee Head

Dr. Faisal M. Almohanna Abaakhnail

Saudi Arabian Cultural Attaché in the UK





This is to certify that

Tariq Alhuwaymel

Attended the


Magnetism 2014 Conference

From

7-8 April 2014

at

The University of Manchester, UK

Signed 
Conferences Department
Date 02/04/2014



This is to certify that

Tariq Alhuwaymel

attended

Magnetism 2015

on the

30th - 31st March 2015

at the

*University of Leeds,
Leeds, UK*

Signed

Conferences Department

Date 17/03/2015

Proceedings of the

Fifth
York Doctoral Symposium
on Computer Science

Department of Computer Science
The University of York
York, UK
November 8th, 2012

University of York technical report **YCS-2012-480**.

Editor:
Victor Bandur

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Development of a Band-gap Measurement Technique for Half-Metallic Ferromagnetic Ultrathin Films

T. Alhuwaymel^{1,2}, A. Hirohata^{1,3} and M. El-Gomati¹

¹Department of Electronics, The University of York, YO10 5DD, UK

²National Nanotechnology Center, KACST, Riyadh, Saudi Arabia

³JST PRESTO, Japan Science and Technology Agency, 332-0012, Japan

{tfha500, atsufumi.hirohata, mohamed.elgomati}@york.ac.uk

Abstract. Spintronics is a new field that aims to realise high performance electronic devices. The electron spins are utilised to create a spin-polarised current which used to be ignored in the conventional electronics. The potential advantages of spintronics are: non-volatile memory, high storage density, high data processing speed and low power consumption. In order to achieve these advantages, there are three key requirements for spintronic devices: high spin polarisation, high Curie temperature (T_c) (i.e., the temperature beyond which ferromagnetic materials becomes paramagnetic) and control of interface structure.

In spintronic devices, ferromagnets (FMs) can be used to inject spins into semiconductors (SCs) and non-magnetic metals. However, the FM/SC structures have a conductivity mismatch which decreases the efficient injection of polarised carriers.¹ To overcome this conductivity mismatch, three approaches have been proposed. The first is to use 100% spin polarised materials (i.e., Half-Metallic Ferromagnetics (HMFs)). The second is to use materials with similar conductivity (e.g., dilute magnetic semiconductors (DMS)). The third is to use a tuned barrier (e.g., MgO). The HMFs are new class of materials that have unique band structures; the majority spin band (usually represented as spin-up band) have metallic band structure while the minority spin band (spin-down band) have semiconducting band structure with a band gap at E_F . Thus, they exhibit 100% spin polarisation at E_F . There are four categories of materials that are theoretically predicted to be HMFs; Heusler alloys, zinc-blend compounds, oxide compounds and perovskites.

In this study, Co-based full-Heusler alloys are used due to good lattice constant matching with major III-V semiconductors, high Curie temperature (greater than 950K for Co_2MnSi), and the ability to control spin density of states (DOS) at the E_F .² The main aim of this study is to develop a new technique to directly measure the band-gap of the Heusler alloys. Circularly polarised infrared (IR) light will be used to excite only minority spins in the Heusler alloys. By controlling the wavelength of the IR light, the excitation energy can be matched to the half-metallic band-gap. This technique will allow us to characterise the width of the minority spin band-gap in the Heusler alloys. This technique will accordingly provide feedback to growth to achieve 100% spin polarisation as a prerequisite for spintronic devices.

¹ G. Schmidt *et al.*, *Phys. Rev. B* **62**, R4790 (2000).

² A. Hirohata *et al.*, *Curr. Opinion Solid State Mater. Sci.* **10**, 93-107 (2006).