


การบ่งชี้ทางไฟฟ้าของเซลล์แสงอาทิตย์ชนิดฟิล์มบาง ZnO/CdS/Cu(In,Ga)Se₂



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ELECTRICAL CHARACTERIZATION OF ZnO/CdS/Cu(In,Ga)Se₂
THIN FILM SOLAR CELLS



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ศูนย์วิทยทรัพยากร
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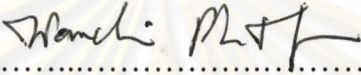
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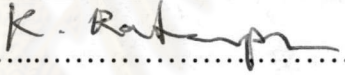
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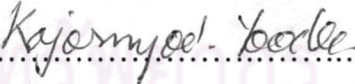
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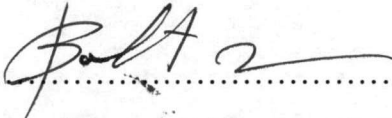
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ปณิตา ชินเวชกิจวานิชย์ : การบ่งชี้ทางไฟฟ้าของเซลล์แสงอาทิตย์ชนิดฟิล์มบาง ZnO/CdS/Cu(In,Ga)Se₂. (ELECTRICAL CHARACTERIZATION OF ZnO/CdS/Cu(In,Ga)Se₂ THIN FILM SOLAR CELLS) อ. ที่ปรึกษา : ผศ. สมพงษ์ ฉัตรภรณ์ , อ. ที่ปรึกษาร่วม : ผศ. ดร. ขจรยศ อยู่ดี , 97 หน้า. ISBN 974-03-0577-6.

ได้เตรียม และ ศึกษากระบวนการนำไฟฟ้าผ่านรอยต่อของเซลล์แสงอาทิตย์ชนิดฟิล์มบาง ที่มีโครงสร้างแบบ Mo/Cu(In,Ga)Se₂/CdS/ZnO โดยการวัดลักษณะเฉพาะกระแส-ความต่างศักย์ไฟฟ้า ทั้งแบบที่วัดในที่มืดและแบบที่ฉายแสงที่อุณหภูมิคงที่ที่อุณหภูมิห้องและที่ขึ้นกับอุณหภูมิ จากการวิเคราะห์ลักษณะเฉพาะกระแส-ความต่างศักย์ไฟฟ้าที่อุณหภูมิห้อง ได้ค่า แพลกเตอร์อุดมคติของไดโอด ความต้านทานอนุกรม และความหนาแน่นกระแสอิ่มตัว สอดคล้องกับกระบวนการนำไฟฟ้าผ่านรอยต่อของไดโอดทั่วไปที่มีกระบวนการรวมตัวในบริเวณปลอดพาหะแบบ Shockley-Read-Hall (SRH) การวิเคราะห์ลักษณะเฉพาะกระแส-ความต่างศักย์ที่ขึ้นกับอุณหภูมิมพบว่านอกจากกระบวนการแบบการรวมตัว การทะลุผ่านได้มีบทบาทร่วมในกระบวนการนำไฟฟ้าผ่านรอยต่อที่อุณหภูมิต่ำด้วย การศึกษาผลของปริมาณสารเจือในชั้นกันชน (CdS) และผลของความเข้มแสงที่มีต่อลักษณะเฉพาะกระแส-ความต่างศักย์ของเซลล์แสงอาทิตย์ที่ประดิษฐ์ขึ้น จากการวิเคราะห์ลักษณะเฉพาะกระแส-ความต่างศักย์ไฟฟ้าในสภาวะต่างๆกันนี้ สามารถนำมาอธิบายกลไกการนำไฟฟ้าผ่านรอยต่อ และเขียนลักษณะแถบพลังงานที่เป็นไปได้สำหรับเซลล์แสงอาทิตย์ชนิดฟิล์มบางที่มีโครงสร้างแบบ Mo/Cu(In,Ga)Se₂/CdS/ZnO

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ลายมือชื่ออาจารย์ที่ปรึกษาร่วม..... *ขจรยศ อยู่ดี*

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KEY WORD: I-V CHARACTERISTIC / SOLAR CELL / RECOMBINATION / HETEROJUNCTION

PANITA CHINVETKITVANICH : ELECTRICAL CHARACTERIZATION OF ZnO/CdS/Cu(In,Ga)Se₂ THIN FILM SOLAR CELLS. THESIS ADVISOR: ASSIST PROF. SOMPHONG CHATRAPHORN, THESIS COADVISOR: ASSIST PROF. KAJORNYOD YOODEE, Ph.D., 97 pp. ISBN 974-03-0577-6.

Mo/Cu(In,Ga)Se₂/CdS/ZnO thin film solar cells were fabricated and studied on their current transport mechanism. The current-voltage characteristics were measured in the dark and illuminated, at room temperature as well as variety of temperature. The dark and illuminated I-V characteristics were deduced for their diode ideality factor (A), series resistance (R_s) and the reverse saturation current density (J_0) which are related to current transport mechanism through the junction. The I-V characteristic curves at room temperature indicate that current transport process is controlled by the Shockley-Read-Hall (SRH) recombination in the space charge region. The analysis of temperature dependent current-voltage $I(V,T)$ measurement indicates that the tunneling contributes to the recombination in the space charge region at low temperature. The studies of the effect of impurity concentration in the CdS buffer layer and the effect of illumination intensity on the I-V characteristics were analyzed and used to draw a possible energy band diagram of the device. It is also used to explain the current transport mechanism at junction.

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