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الهدف من هذا البحث هو تصميم وتصنيع مرشحات وموهنات بصرية لبعض الأطوال الموجية فى المنطقتين تحت الحمراء و المرئية من الطيف الكهرومغنتطيسى .
تم إختيار مادتي أكسيد الخارصين وأكسيد المنجنيز لتصنيع المرشحات والموهنات فى شكل أقراص وذلك بناء علي الفحوصات الطيفية الأولية التي أجريت لهذه المواد.
كبست المواد فى شكل أقراص بإستخدام طريقة التشكيل بال قولبة، حيث تم تصنيع ثلاثة أنواع من الاقراص، النوع الأول هو خليط من أكسيد الخارصين مع بروميد البوتاسيوم والنوع الثانى من أكسيد المنجنيز مع بروميد البوتاسيوم، حيث تم ضغط هذين النوعين فى شكل أقراص مختلفة بتغيير التركيز والسك معاً. أما النوع الثالث فهو عبارة عن خليط من أكسيد الخارصين وأكسيد المنجنيز وبروميد البوتاسيوم، حيث تم ضغط هذه النوع بتغيير السك أيضاً.

تم تعريض هذه الأقرص لليزرات ذات أطوال موجية معينة (810,675, 632.8, 532) ،
820, 940, 1064 and) نانومترو قيست خصائصها للتوهين وذلك بإستخدام كاشف ضوئي وكاشف رقمى حساس يسجل شدة الليزر السا قطة والنافذة فى كل قرص ومنها تم تحديد م قدرة كل قرص على توهين أو ترشيح الشدة السا قطة. حيث دونت النتائج ومثلت بيانياً ومن ثم تم حساب معامل إمتصاص هذه الأقرص للأطوال الموجية المستخدمة.
من أقراص النوع الأول أعلي قيمة للنفاذية كانت عند الطول الموجي 820 نانومتر، حيث أن أكثر من 77 % من الأشعة السا قطة نفذت. أى أن أقراص من هذا النوع يمكن إستخدامها كمرشحات عند هذا الطول الموجي وأيضاً أقل نفاذية كانت عند الأطوال الموجية 532 و 632.8 نانومتر، حيث أن أقل من 0.4 % من الأشعة السا قطة نفذت. مما يعنى إمكانية إستخدام هذه الأقرص كموهنات لهذه الأطوال الموجية. أما من النوع الثانى فلم نتحصل علي قيم نفاذية. أما أقراص النوع الثالث فمنها حصلنا على أعلي قيمة للنفاذية عند الطول الموجي 1064 نانومتر، حيث أن أكثر من 70 % من الأشعة السا قطة نفذت. أى أن أقراص هذا النوع يمكن إستخدامها كمرشحات عند هذا الطول الموجي وأيضاً أقل نفاذية كانت عند الطول الموجي 675 نانومتر، حيث أن أقل من 2 % من الأشعة السا قطة نفذت. مما يعنى إمكانية إستخدام هذه الأقرص كموهنات لهذه الأطوال الموجية.

بناء على النتائج المتحصلة، تم إقتراح بعض الأعمال المست قبله.

Abstract

In this work, the main objective was to design and fabricate different disks to act as optical filters and attenuators for 6avelengths in the Visible (VIS) and Infrared Regions (IR) of the electromagnetic spectrum.

Zinc Oxide (ZnO) and Manganese Oxide (MnO₂) were selected to fabricate the disks based on the spectrometric investigations of the disks in the middle and near IR regions. The disks were fabricated by compression molding method that produces three groups of disks. The first group includes zinc oxide with the potassium bromide (KBr) and the second group includes manganese oxide with the potassium bromide, those two groups were produced with different thickness and different concentration. The third group includes zinc oxide and manganese oxide with potassium bromide that produces different disks by changing the thickness.

Different types of lasers with (532, 632.8, 675, 810, 820, 940 and 1064nm) wavelengths were used in this study, as light sources. Photodetector and Digital multimeter were used to record the incident and transmitted intensities. Graphs were drawn from the results and the absorption coefficients were calculated for all groups. For the disks of group (1), the high value of transmitted intensity was for 820nm, where up to 77% of incident intensity was transmitted. Which means those disks can be used as filters in this wavelength. And the low value of transmitted intensity was for 532nm and 632.8nm, where just 0.2% and (0.4 to 1.9) % of the incident intensity was transmitted, respectively. Those disks of group (1) can be used as attenuators in these wavelengths. For the disks of group (2), no result, were obtained for the transmitted intensity. For the disks of group (3), the high value of transmitted intensity was for 1064nm, where up to 70% of incident intensity was transmitted. It means that those disks of group (3) can be used as filters in this wavelength. And the low value of transmitted intensity was for 675nm, where just 2% of the incident intensity was transmitted. It means that those disks of group (3) can be used as attenuators in this wavelength.

From the obtained results some future works were suggested.

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Dedication

I dedicate this research to my family, with whom all things are possible.