



قال تعالى :

﴿اللَّهُ نُورُ السَّمَاوَاتِ وَالْأَرْضِ ۚ مِثْلُ نُوْرِهِ كَمِثْقَاتٍ فِيهَا مِصْبَاحٌ ۖ الْمِصْبَاحُ فِي رِجَاةٍ ۖ الرُّجَاةُ كَأَنَّهُ نُورٌ مُّبِينٌ ۚ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ زَيْتُونَةٍ لَا شَرْقِيَّةٍ وَلَا غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ نَارٌ ۚ نُورٌ عَلَى نُورٍ ۗ يَهْدِي اللَّهُ لِنُورِهِ مَن يَشَاءُ ۚ وَيَضْرِبُ اللَّهُ الْأَمْثَالَ لِلنَّاسِ ۗ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ﴾

سورة النور (35)

DEDICATION

This work is dedicated

To Fathers and Mothers

To Brothers and Sisters

To dear Teachers

To all Friends

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All thanks to Allah who gave us strength, patience, health and motivation to work hard towards completing this study. We would like to thank our supervisor Miss. **Nada Abbas Ahmed**, for her guidance and support that she offered during writing of this research. We would also like to deeply thank the Institute of Laser and its dean Dr. **Ali Abdel Rahman Saeed Marouf**, for their beautiful cooperation with us in order to complete this work.

Abstract

In this research, the effect of heat on the optical properties of glass was investigated, and we studied whether ordinary glass shows any non-linear behavior by heat or not.

The method that was used is by applying a He-Ne laser to a glass sample (soda-lime glass), then applying a heat source perpendicular to the glass. Heat increases the kinetic energy of glass particles by vibration of molecules. This vibration may increase the susceptibility of glass to absorb light or may turn it into a non-linear material.

From results and graphs, it was found that the optical properties of the glass has changed, and the glass behaves nonlinearly through heating and cooling processes (from $T = 85^{\circ}\text{C}$ until the end of cooling process).

المستخلص

في هذا البحث، تم التحقق من تأثير الحرارة على الخصائص البصرية للزجاج، ودراسة ما إذا كان الزجاج العادي يظهر أي سلوك غير خطي عن طريق الحرارة أم لا.

الطريقة التي تم استخدامها هي من خلال تطبيق ليزر الهيليوم-نيون على عينة الزجاج (زجاج الصودا والجير)، ثم تطبيق مصدر حرارة بحيث يكون عمودياً على الزجاج. الحرارة تزيد من الطاقة الحركية لجزيئات الزجاج عن طريق اهتزاز الجزيئات. هذا الاهتزاز قد يزيد من قابلية الزجاج على امتصاص الضوء أو قد يحوله إلى مادة غير خطية.

من خلال النتائج و الرسوم البيانية، وجد أن الخصائص البصرية للزجاج قد تغيرت، وأن الزجاج يسلك سلوكاً لا خطياً عن طريق عمليتي التسخين والتبريد (من $T = 85\text{ }^{\circ}\text{C}$ حتى نهاية عملية التبريد).

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