

**AN INVESTIGATION INTO THE USE OF
QUANTUM DOTS
FOR PV SOLAR POWER**

By

Kyriakos Pavlides

Project report submitted to the
Department of Mechanical Engineering

Of the Higher Technical Institute

Nicosia Cyprus

In partial Fulfilment of the requirements for the diploma of

TECHNICIAN ENGINEER

In

MECHANICAL ENGINEERING

June 2008

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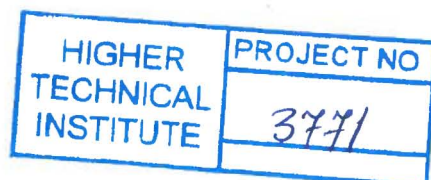
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PREFACE

Introduction

This text was written for an introductory course in my diploma project in “An investigation into the use of quantum dots for PV solar power.”

The primary object of this project is to understand how Quantum Dots work and what their applications in life are.

I have tried to explain their functions and feature by executing my own research.

Objectives

1. To explain the way quantum dots work.
2. To present the key quantum dots features.
3. To enumerate the uses of quantum dots.
4. To explain the advantages of using quantum dots for PV solar power.
5. To integrate into a glossary all pertinent quantum dot terminology.

Acknowledgements

I recognise that no single approach can satisfy all needs and I am grateful to my Supervisor and Senior Lecturer Dr Nikos Angastiniotis for his valuable suggestions and crucial informations.

I would also like to thank my sister for the support and her effort to check all the documents that I wrote and put them in the right form.

Any suggestions and/or criticism are welcome in order to improve this project and my knowlegements.

Kyriakos C. Pavlides

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HISTORICAL NOTE

Quantum Theory

The Quantum theory was developed during the first quarter of the 20th century for the explanation of a series of physical phenomenon of matter and radiation which could not be explained with the “classic” physics point of view.

In 1900 the German physicist Max Carl Plank formulates the theory of quantum. According to this the emission and absorption of light, and in general the electromagnetic radiation, is not continuous but discontinuous. It can also be found in parts or elemental quantities, which are named quantum of light or photons, as Einstein prefer to call.

Energy E which bound every quantum dot of a monochromatic radiation of frequency (ν) is equal with $E=h*\nu$, where h is a universal constant known as Plank's Constant and it's equal to $6.625*E-27$ erg.sec

The quantum theory was developed and advanced during the 20th century and today is governing the modern physics way of thinking. The old classics physics, which are true, under some thoroughfare, h was considered as negligible value because of its extraordinary value.

The most important conclusions, after experiments that lead to the need of gradually development of quantum theory are:

1. Thermal radiation of solids
2. The photoelectric phenomenon
3. Special heat of crystals
4. Description of atoms
5. Kapton's phenomenon
6. Diffraction of electrons
7. Quantum mechanics, wave mechanics
8. Perplexity state

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Chapter 1: Introduction to Quantum Dots

Quantum dots are the edge of modern technologies, even though their theory was discovered in the first quarter of the 20th century by Max Carl Planck. (History notes) Quantum dots will boost the limits of today's technology. Who could ever believe that such a small particle can do such great things?!

My project is to make an investigation into how the quantum dots will help the photovoltaic solar power to increase its efficiency, but also to involve with quantum dots in general discovering the way that quantum dots work, feature and discover the great variety of applications that the "artificial atoms" have.

