UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO
POSGRADO EN CIENCIAS FÍSICAS

OPTICAL RESPONSE OF PARTIALLY EMBEDDED NANOSPHERES

TESIS
QUE PARA OPTAR POR EL GRADO DE:
MAESTRO EN CIENCIAS (FÍSICA)

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Abstract/Resumen

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Introduction

It is recommended to fill in this part of the document with the following information:

- Your field: Context about the field your are working
  Plasmonics -> Metameterials -> Biosensing
- Motivation: Backgroung about your thesis work and why did you choose this project and why is it important.
  Fabrication -> Partially embedded NPs -> No analytical (approximated) method physically introduces the incrustation degree. There are numerical solutions and Effective Medium Theories approaching the problem but the later only as a fitting method.
- Objectives: What question are you answering with your work.
  Can optical non invasive tests (IR-Vis) retrieve the average incrustation degree for monolayers of small spherical particles?
- Methology: What are your secondary goals so you achieve your objective. Also, how are you answering yout question: which method or model.
  Bruggeman homogenization theories on bidimensional systems?
  Is the dipolar approximation is enough or do we need more multipolar terms?
  Do we need the depolarization factors?
- Structure: How is this thesis divides and what is the content of each chapter.

Chapter 1

Optical properties of single plasmonic nanoparticles

1.1 Mie Theory: Quasi-static Approximation

1.2 Depolarization Factors

1.3 Substrate effects

Chapter 2

Collections: Effective Medium Theories

2.1 3D theories: summary

2.1.1 Bruggemann & Maxwell Garnett

2.2 2-D Arrays

2.2.1 Island Theory

2.2.2 Dipolar Model

Chapter 3

Results and discussion

3.1 Single particle: Incrustation degree (COMSOL + approximate solutions)

3.2 Analytical extention to a monolayer

Chapter 4

Conclusions

Appendix A

Finite Element Method

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