

3.063 Report

Suggested Approach:

First, go on line or to the library and browse looking for leads of suitable literature/topics. A list of suggested topics is attached. Do some preliminary reading. Think about what seems interesting to you. Draft a tentative outline and look for further reference materials.

A suitable topic should be something fairly specific so that you can *focus on aspects of polymer physics* in your report.

I'm looking for a *minimum of 15 typed pages*, inclusive of references, figures and tables. The figures can be neatly hand- or computer-drawn or copies of literature (be sure to cite references appropriately). If possible, embed key graphics/figures into the text. Be sure all figures have figure captions and scale bars, coordinate frames etc. Read over the assignment and be sure your report responds to all items. If you believe it is relevant, briefly discuss any safety issues, environmental impact, and socio-economic issues. Make good use of graphs, tables, and schematics; utilize internally consistent units in all sections of the report. I'm also expect you to write well and evidence that you have considered your topic in light of what we have covered in 3.063. Hence, place emphasis on *the basics of polymer physics*.

References

Include references from class, the internet, patents, the library or company literature. Be sure to properly cite and attribute all informational resources. At a minimum cite: authors, title, source, source location, date.

Some Suggested Topics:

Electrophoretic actuators

Ultra strong polymers for ballistic protection

Dendritic polymers for drug delivery

Conjugated Polymer Sensors

Birefringence as a Measure of Chain Orientation

Polymeric Coatings on Optical Fibers

Plastic Contact Lenses

Hydrogels

Self Assembled Photonics

3d Interference Lithography – positive and negative resists

2D Lithographic Masks via Self Assembled BCPs - Flash Memory

Morphology of Immiscible Blends

Ionomer Clusters

Block Copolymers

 noncrystalline

 liquid crystalline

 crystalline

Block Copolymer-Homopolymer Blends
Determination of Polymer Surface Energy
Single Walled Carbon Nanotubes – an example of a class of polymers
Adhesion of Polymers
Optical Properties of Liquid Crystalline Polymers
Polymer Waveguides
Polymers for Optical Storage
Photoelastic Determination of Stresses
Crystalline Polymers
Fibers
Biodegradable Fibers
Polyelectrolytes
Gels
Polyelectrolyte Gels
Defects in Mesophases
Role of Defects in Controlling Properties
Techniques applied to Polymer Morphology
 Scattering
 Light scattering
 Wide angle X-ray and/or neutron scattering
 Small angle X-ray and/or neutron scattering
 Electron diffraction
 Microscopy Techniques
 TEM
 SEM
 AFM
 Thermal Analysis
 DSC
 DMA
Additives to Polymers and Sequestration of Nanoparticles in Blends
Targeted Location and Orientation of Nanoparticles in Block Copolymers
Polymerization Induced Phase Separation (PIPS)
Orientation Methods for controlling polymer structure
 Flow Fields
 Electric, Magnetic Fields
 Substrates
Epitaxy in Polymers
Thin Film Patterning - terracing and dewetting
Polymer Foams
Segmented copolymers (polyurethanes, polyetheresters)
Inorganic and metal-containing polymers