ÓBUDAI EGYETEM
ÓBUDA UNIVERSITY

John von Neumann University

Semester Report

Preparation and investigation of nanocomposites with polymer matrix

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Research Goal

"Preparation and Investigation of Polymer Matrix Nanocomposites"

Research Goal

- Compounding of materials
- Manufacture the recycled materials
- Produce specimen for the tests
- Determine the complex viscosity as a function of shear stress
- Compare the intercalation level of CNT-nanocomposite
- Analyze the crystalline structure of matrix polymers.
- Effects of CNT on dimension of the specimens
- Effects of CNT and recycling on the mechanical properties of the specimen.
- Effect of CNTs
- Dispersion of CNT
- Effect of CNT on the rate of crystallization, and on the overall crystallinity.

Work plan

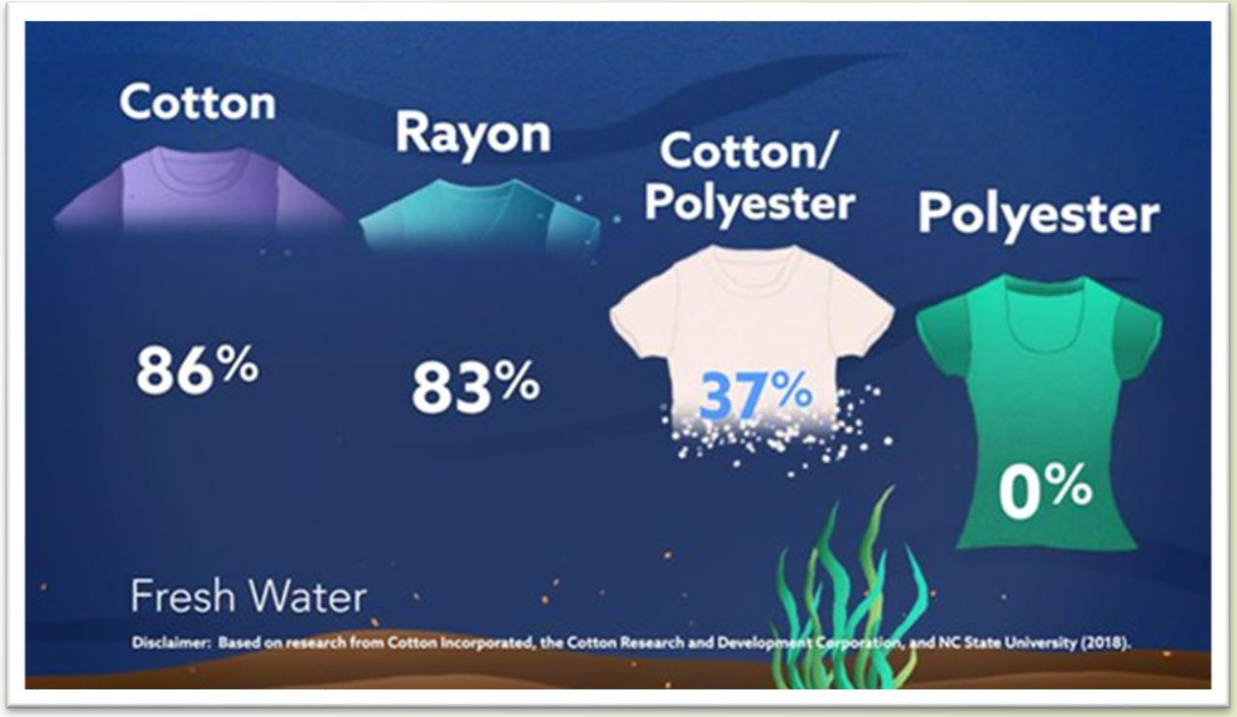
Work plan

- **Extrusion of the all compositions**
- **Re-extrusion of the half of the materials (simulated recycling)**
- **Injection moulding of materials (2 mm thick plates specimen)**
- **Rheological measurement (from granulates)**
- **XRD measurement**
- **Measurement mould shrinkage of the materials.**
- **Mechanical tests (tensile or flexural, impact test, DMA)**
- **Oxygen permeability test**
- **SEM investigation**
- **DSC measurement**

a

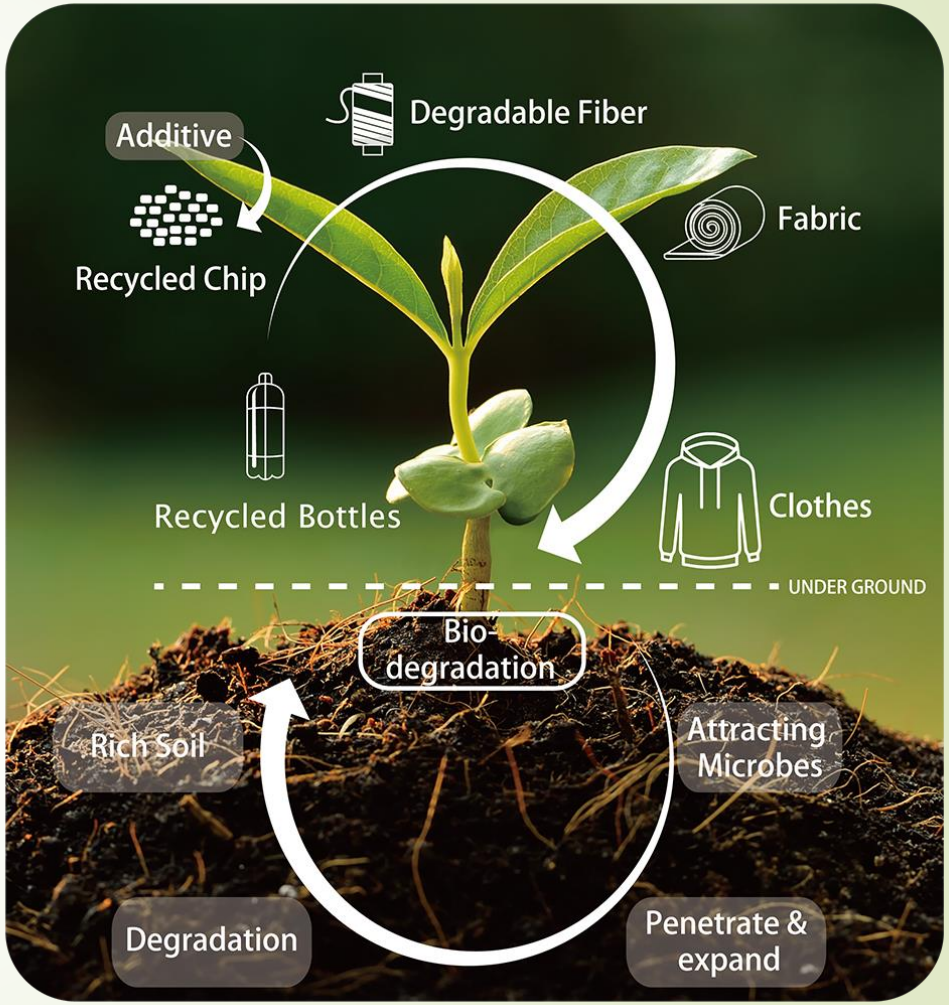
b

Materials


Cotton
Rayon
Cotton/
Polyester
Polyester
86%
83%
37%
0%
Fresh Water
Disclaimer: Based on research from Cotton Incorporated, the Cotton Research and Development Corporation, and NC State University (2018).

Materials

- **Polyesters**
  - **Non-biodegradable**
    - **PET**
    - **PBT**
  - **Biodegradable**
    - **PLA**
    - **PBS**

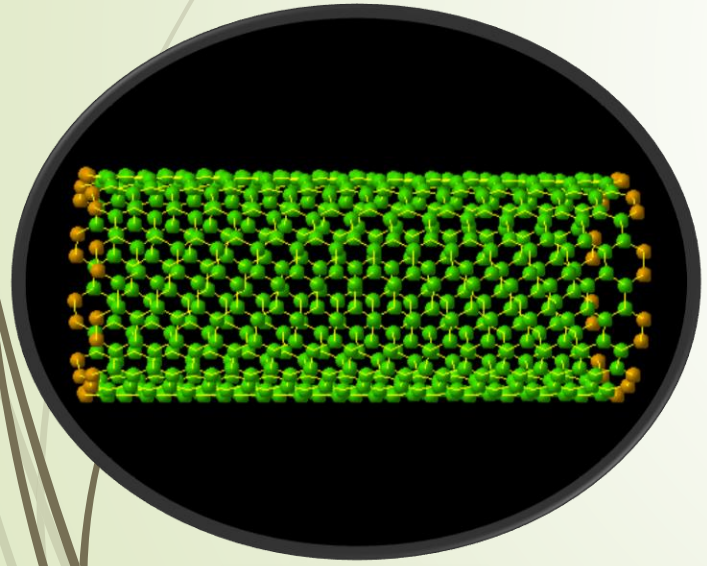


Materials

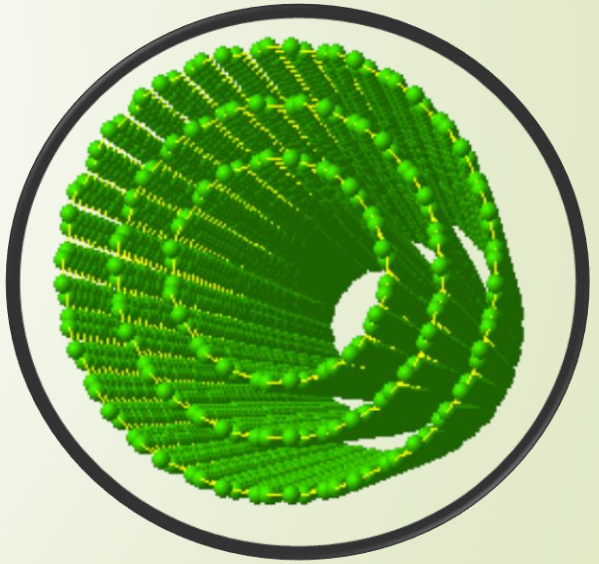
CNTs

SWCNTs

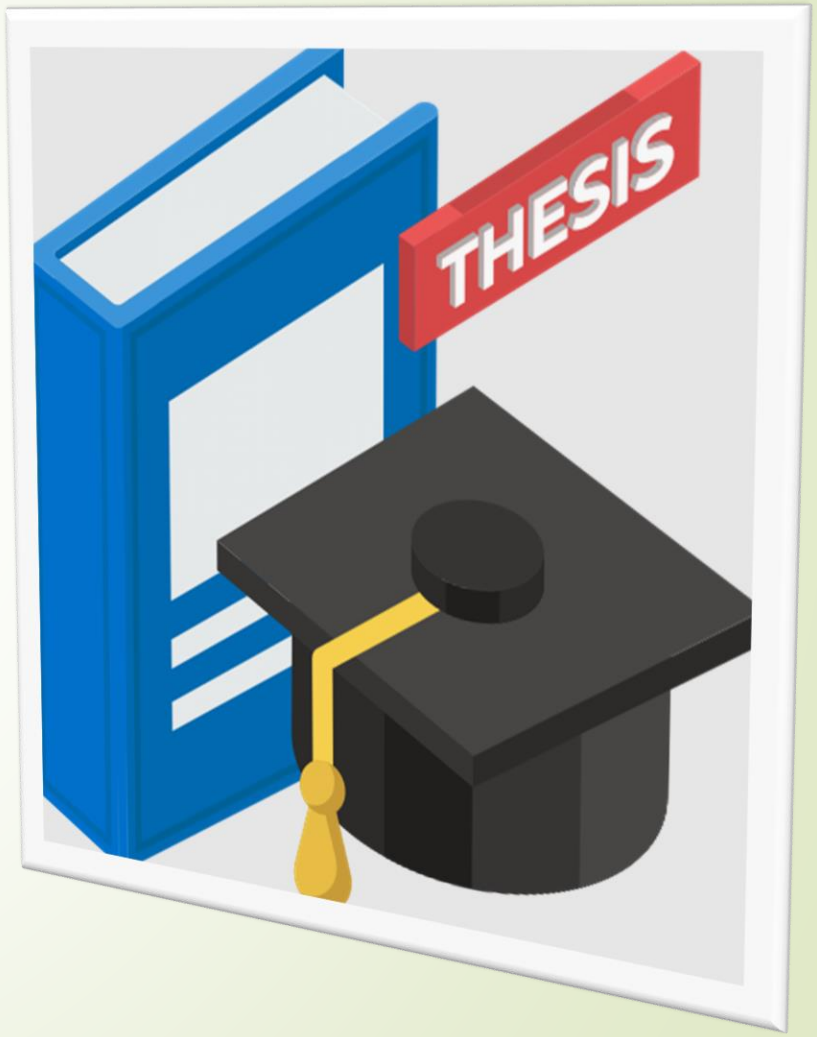
MWCNTs



- ***High thermal conductivity***
- ***High electrical conductivity***
- ***CNTs aspect ratio***
- ***CNTs have very high tensile strength***
- ***CNTs are highly flexible — can be bent considerably without damage***
- ***CNTs have a low thermal expansion coefficient***
- ***CNTs are good electron field emitters***



Planned thesis



Planned thesis

a

b

The CNT has different effect on crystallinity of different polyester.

Whether it's depends on crystallization rate?

The effect of CNT on the physical and mechanical properties of polyesters.

The CNT could compensate the property deterioration of the polymers in different level.

Semester Activities

Semester Activities

- **I have taken the two courses:**

  *** "Physics of macromolecules " with Prof. Dr. Károly Belina**

  *** "Polymeric nanocomposites" with Dr. Andrea Ádámné Major**

- **I taught chemistry for B.Sc. students as a chemistry lecturer at John von Neumann University.**
- **I have been doing the *literature review* related to polymer-MWCNTs nanocomposites.**
- **I have written an scientific article '*Effects of CNTs on polymer matrix: a focused review with lasers*', submitted to Gradus for publishing, and also working on another scientific article.**

Thanks for your Attention