Ερευνητική Ομάδα Συνεργαζόμενων Εργαστηρίων:

- **Εργαστήριο Τεχνολογίας Τροφίμων** (http://foodtechlab.deapt.uwg.gr, http://www.deapt.upatras.gr/el/lab/siteindex/2), Τμήμα Διοίκησης Επιχειρήσεων Αγροτικών Προϊόντων και Τροφίμων, Παν/μιο Πατρών (http://www.deapt.upatras.gr/el)
- **Εργαστήριο Μηχανικής Συνθέτων & Ευφυών Υλικών** (http://csmlab.materials.uoi.gr/index.php/el/), Τμήμα Μηχανικών Επιστήμη Υλικών, Παν/μιο Ιωαννίνων (http://www.materials.uoi.gr/)
- **Εργαστήριο Βιοτεχνολογίας** (http://biotechlab.bat.uoi.gr/index.php?lang=el), Τμήμα Βιολογικών Εφαρμογών και Τεχνολογιών, Παν/μιο Ιωαννίνων (http://www.bat.uoi.gr/)

Collaborating Labs:

- **Laboratory of Food Technology** (http://foodtechlab.deapt.uwg.gr, http://www.deapt.upatras.gr/en/lab/siteindex/2) , Department of Business Administration of Food and Agricultural Enterprises, University of Patras (http://www.deapt.upatras.gr/en)
- **Composite and Smart Materials Laboratory (CSML)** (http://csmlab.materials.uoi.gr/index.php/en/), Materials Engineering Department, University of Ioannina (http://www.materials.uoi.gr/)
- **Biotechnology Laboratory** (http://biotechlab.bat.uoi.gr/index.php?lang=en), Department of Biological Applications and Technologies, University of Ioannina (http://www.bat.uoi.gr/eng/index.php)

Research Activities of the collaboration related to packaging:

- Development and characterization of active packaging with multi-functional properties
- Production of:
    - Biopolymers
- Use of:
    - Active ingredients
    - Active polymers
    - Nanoscale reinforcement from renewable resources
- Targeting at packaging materials (mainly flexible packaging for food applications) with:
    - Improved mechanical properties
    - Increased barrier

    - Enhanced thermal stability
    - Biodegradability
    - Antimicrobial / Antibacterial properties

Infrastructure / Knowhow related to packaging:

In the field of synthesis, development and characterization of polymer based packaging materials following infrastructure/knowhow is available among the three collaborating labs:

- Synthesis and preparation of polymer based films:
    - Hydraulic press with heated platens
    - Vacuum ovens
    - Mini-extruder
    - Dissolver equipped with Torus mill
    - Tip Sonicator
    - Enzyme and Microbial Bioreactors
- Structural characterization:
    - Spectrophotometer UV-Vis
    - Powder XRD
- Mechanical characterization:
    - Universal testing machine (30 kN load cell)
    - Mini-tester with 100N, 500N and 5000N load cell
- Barrier properties
    - Film’s Oxygen permeability measurement system
    - Film’s moisture permeability measurement system
    - Water absorption
    - Organic vapor/gas permeability
- Antimicrobial / antibacterial properties
    - Disc diffusion method
    - Agar dilution method
    - Broth dilution method
    - Microtiter plate-based method

Assess is available to the following infrastructure via the Network of Research Supporting Laboratories (University of Ioannina) and the Departmental Labs

- Surface characterization
    - Scanning Electron Microscopy
    - Atomic Force Microscopy
- Thermal Analysis
    - Differential Scanning Calorimetry
    - Thermogravimetric Analysis
    - Dynamic Mechanical Analysis
- Accelerated aging / Weathering tests

Collaborating Members / Contact Information

- Laboratory of Food Technology, Department of Business Administration of Food and Agricultural Enterprises, University of Patras
    - Athanasios Ladavos, Professor (alantavo@upatras.gr)
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- Composite and Smart Materials Laboratory (CSML), Materials Engineering Department, University of Ioannina
    - Nektaria-Marianthi Barkoula, Associate Professor (nbarkoul@cc.uoi.gr)
- Biotechnology Laboratory, Department of Biological Applications and Technologies, University of Ioannina
    - Haralampos (Haris) Stamatis, Professor (hstamati@uoi.gr)
    - Petros Katapodis, Assistant Professor (pkatapo@cc.uoi.gr)

Relevant Publications

- Vlacha, M., Giannakas, A., Katapodis, P., Stamatis, H., Ladavos, A., Barkoula, N.-M. On the efficiency of oleic acid as plasticizer of chitosan/clay nanocomposites and its role on thermo-mechanical, barrier and antimicrobial properties - Comparison with glycerol (2016) Food Hydrocolloids, 57, pp. 10-19.

- Giannakas, A., Vlacha, M., Salmas, C., Leontiou, A., Katapodis, P., Stamatis, H., Barkoula, N.-M., Ladavos, A. Preparation, characterization, mechanical, barrier and antimicrobial properties of chitosan/PVOH/clay nanocomposites (2016) Carbohydrate Polymers, 140, pp. 408-415.

- Grigoriadi, K., Giannakas, A., Ladavos, A.K., Barkoula, N.-M. Interplay between processing and performance in chitosan-based clay nanocomposite films (2015) Polymer Bulletin, 72 (5), pp. 1145-1161.

- Katerinopoulou, K., Giannakas, A., Grigoriadi, K., Barkoula, N.M., Ladavos, A. Preparation and characterization of acetylated corn starch-(PVOH)/clay nanocomposite films (2014) Carbohydrate Polymers, 102 (1), pp. 216-222.

- Giannakas, A., Grigoriadi, K., Leontiou, A., Barkoula, N.-M., Ladavos, A. Preparation, characterization, mechanical and barrier properties investigation of chitosan-clay nanocomposites (2014) Carbohydrate Polymers, 108 (1), pp. 103-111.

- Grigoriadi, K., Giannakas, A., Ladavos, A., Barkoula, N.-M. Thermomechanical behavior of polymer/layered silicate clay nanocomposites based on unmodified low density polyethylene (2013) Polymer Engineering and Science, 53 (2), pp. 301-308.

- Giannakas, A., Xidas, P., Triantafyllidis, K.S., Katsoulidis, A., Ladavos, A. Preparation and characterization of polymer/organosilicate nanocomposites based on unmodified LDPE (2009) Journal of Applied Polymer Science, 114 (1), pp. 83-89.

- Giannakas, A., Spanos, C.G., Kourkoumelis, N., Vaimakis, T., Ladavos, A. Preparation, characterization and water barrier properties of PS/organo-montmorillonite nanocomposites (2008) European Polymer Journal, 44 (12), pp. 3915-3921.