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STSM - Validation of activity of prepared biopolymer-based nanofibers containing plant essential oils

COST FP₁₄₀₅

ACTIVE AND INTELLIGENT FIBRE-BASED PACKAGING – INNOVATION AND MARKET INTRODUCTION

09.11.2017.



COST is supported by
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Horizon 2020

Motivation

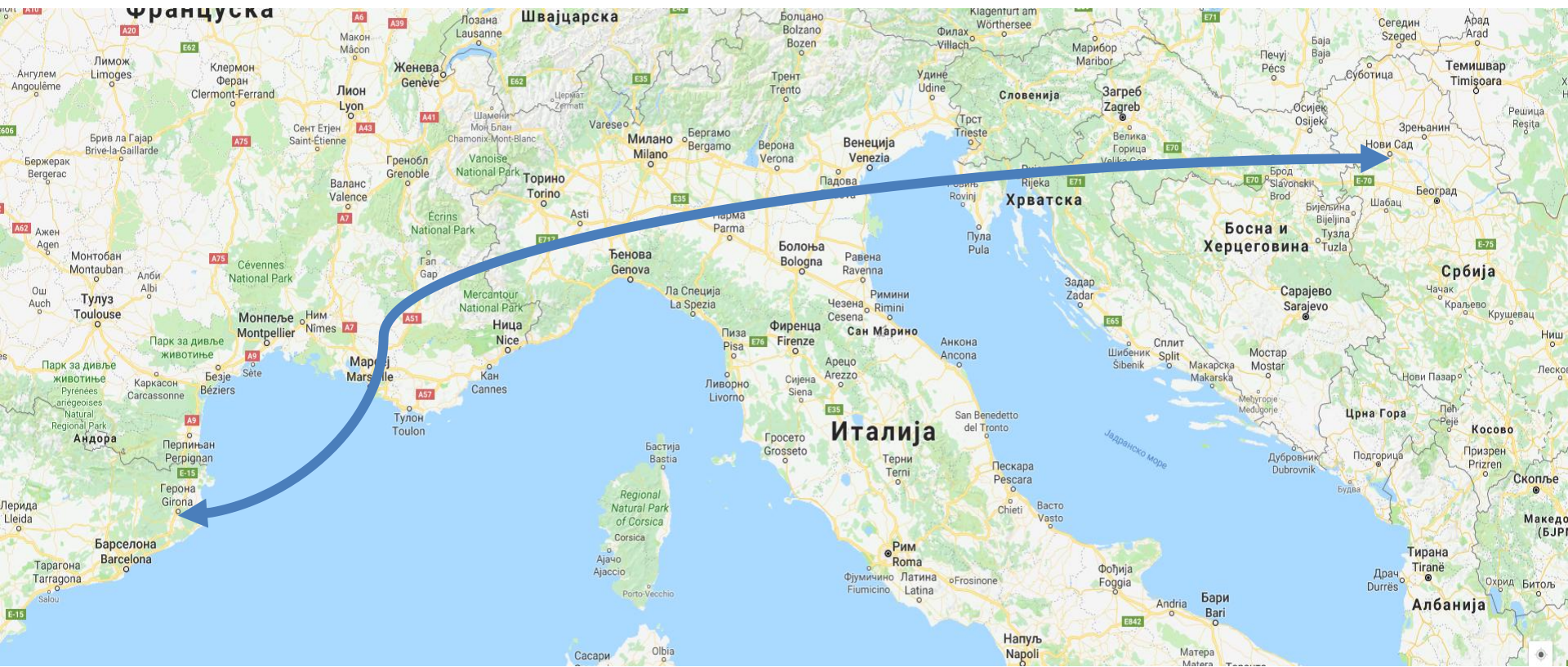
- Oxidation as one of the main triggers of meat and meat products spoilage
- Trend of using active packaging materials instead of using additives



Experts in meat science



Electrospinning of polymer-based nanofibers

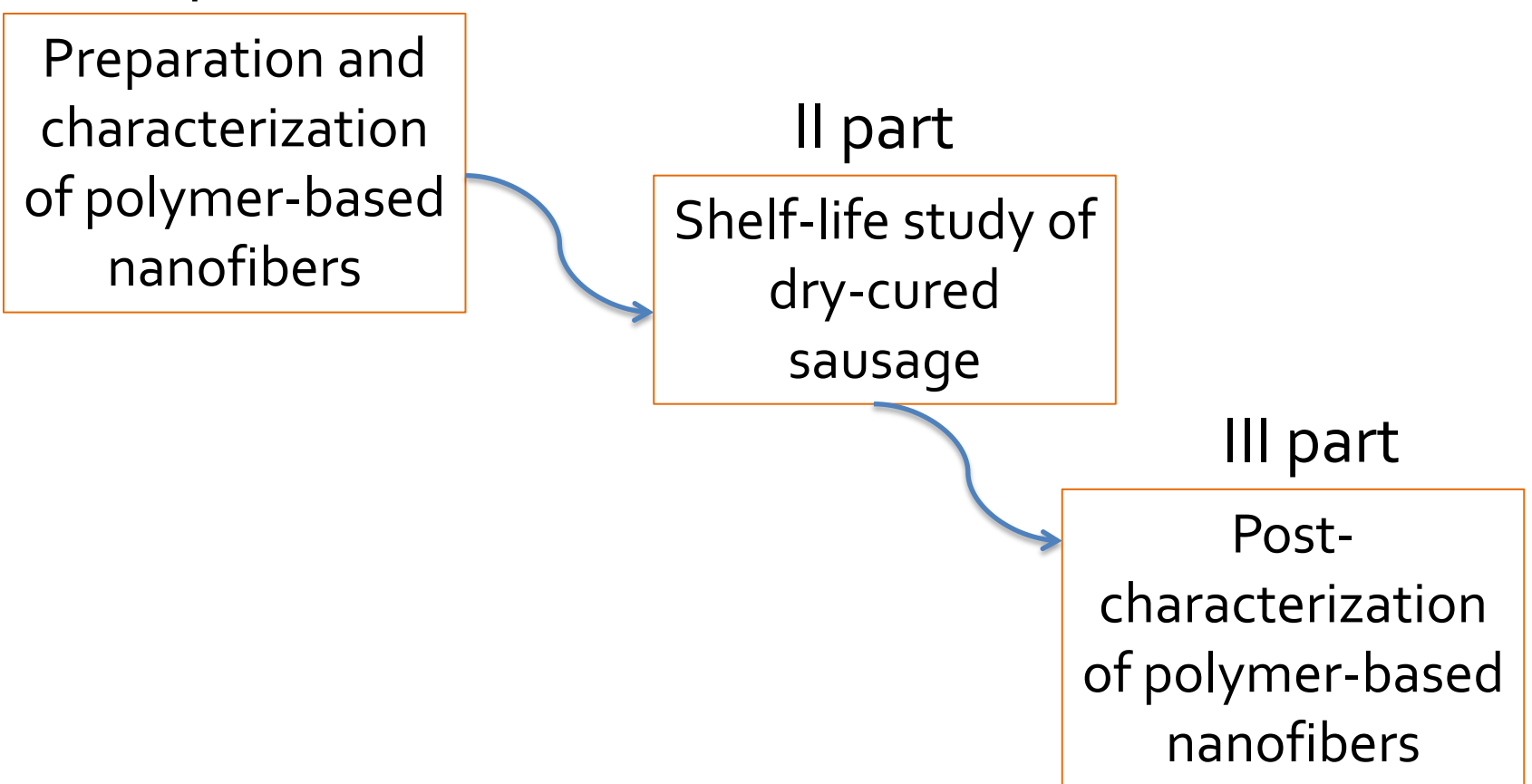


Design of experiment



I part

Preparation and
characterization
of polymer-based
nanofibers



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graph LR; A[Preparation and characterization of polymer-based nanofibers] --> B[Shelf-life study of dry-cured sausage]; B --> C[Post-characterization of polymer-based nanofibers];
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II part

Shelf-life study of
dry-cured
sausage

III part

Post-
characterization
of polymer-based
nanofibers

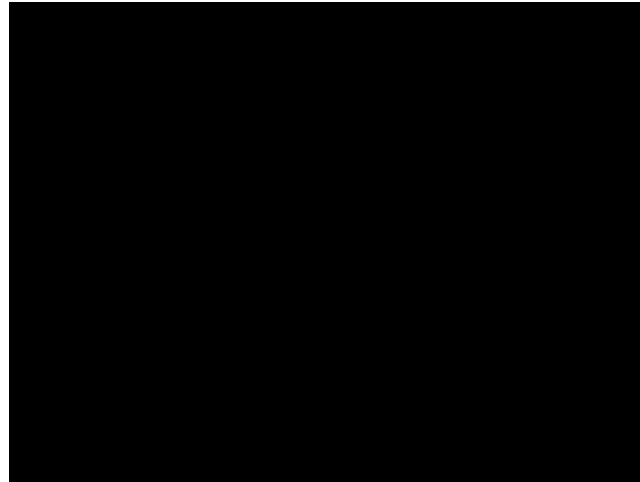
Preparation of nanofibers



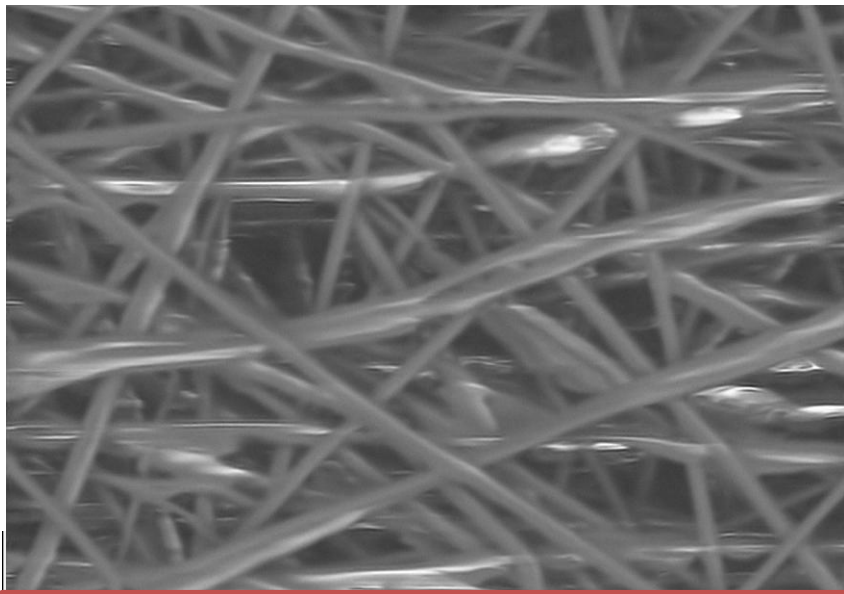
PLA + essential oils: fennel, thyme, juniper and black cumin

Concentration of essential oils : 10 wt%

Electrospinning technique as polymer processing method

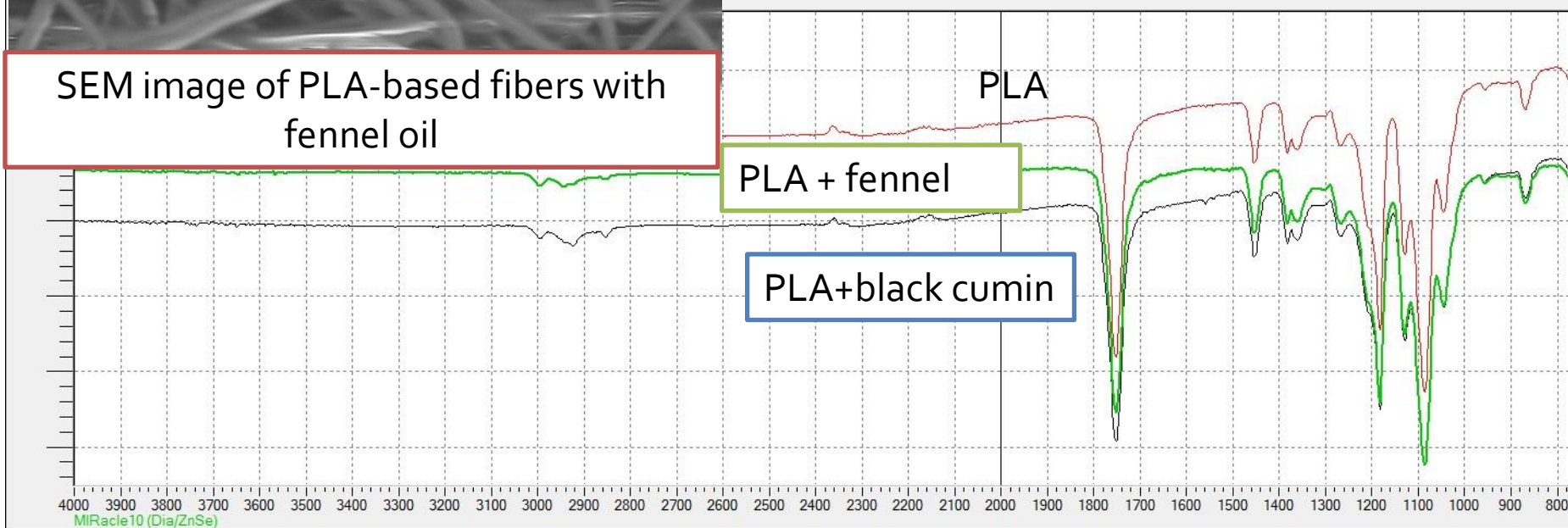


Results – I part

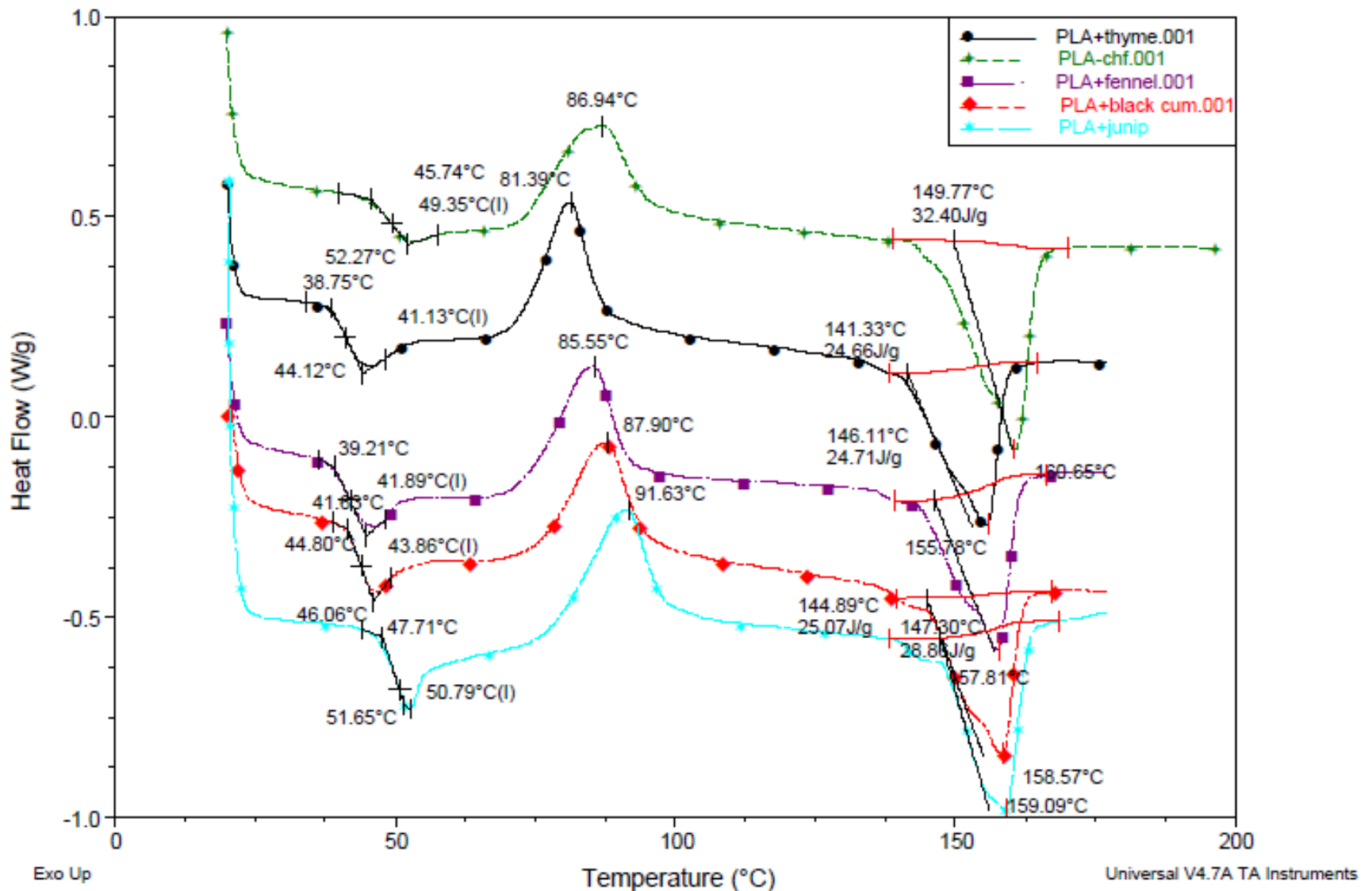


SEM image of PLA-based fibers with fennel oil

Antioxidant activity ~ 0.002 mM Trolox/g




Results – I part



Results – II part



Results – II part



6 batches were prepared: 1. without fibers

2. PLA

3. PLA + fennel oil

4. PLA + thyme oil

5. PLA + juniper oil

6. PLA + black cumin oil

- 3 slices for each sampling time were packed into metal bags and served as color control

Sampling times t_0 , t_7 , t_{14} , t_{21} and t_{28}

Color measurement

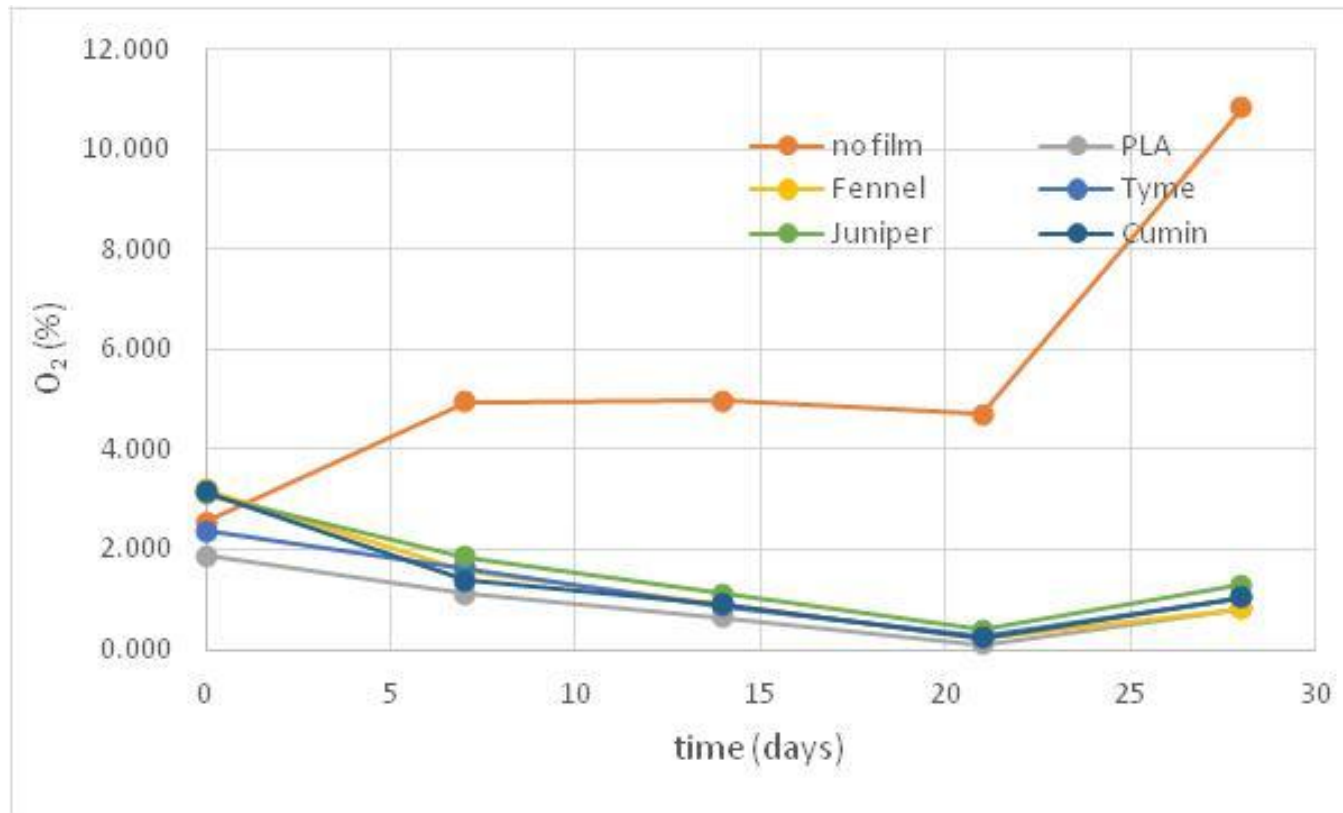
TBARS – lipid oxidation

Imaging

Oxygen rate

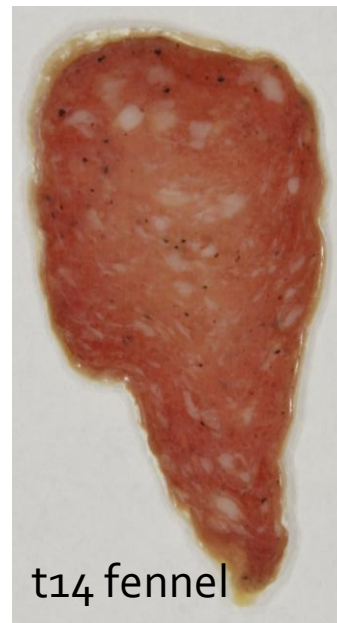
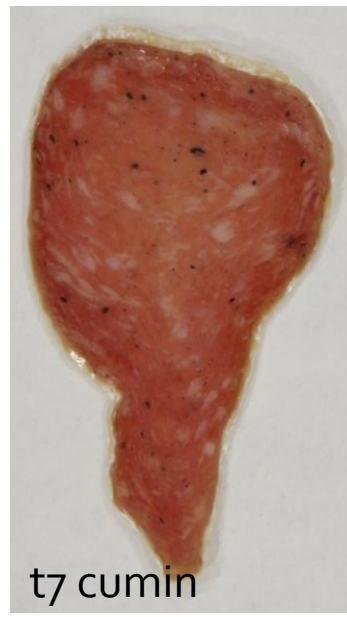
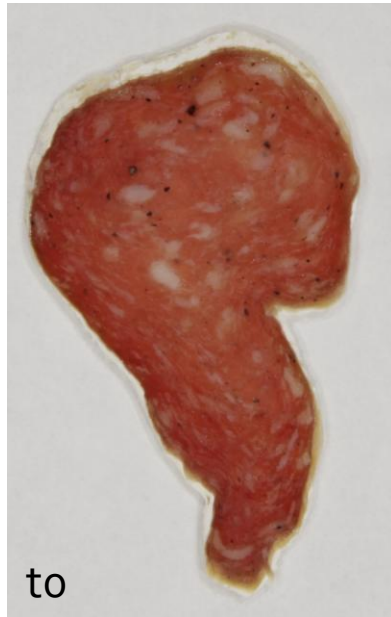
Hyperspectral analysis

Results – II part

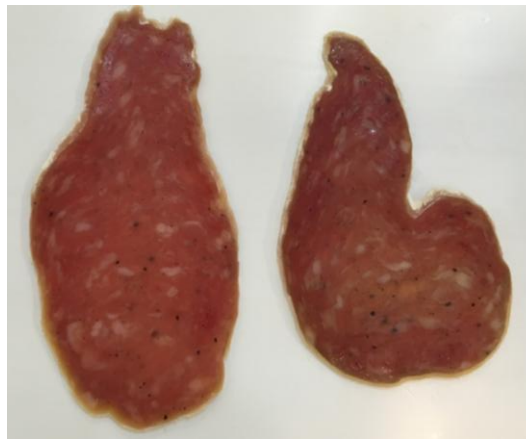


Oxygen rate

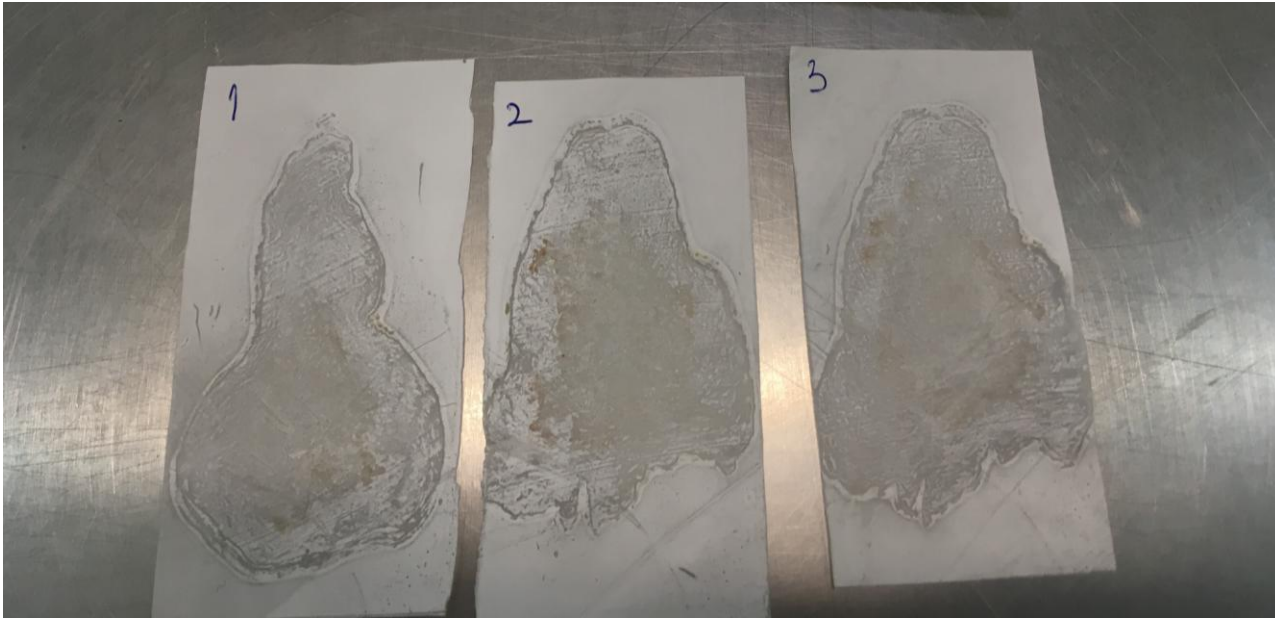
Results - II part



L a* b* values – significant differences by time within a* values



Results – III part



Post-characterization of used PLA-based nanofiber films



ACKNOWLEDGEMENT

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