SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA17107
STSM title: Characterization of different moisturizers mixture and their behavior on PVB electrospun patches for skin treatment
STSM start and end date: 22/09/2019 to 12/10/2019
Grantee name: Zuzanna Krysiak

PURPOSE OF THE STSM:

The purpose of this STSM was to measure the viscosity of different oils in particular: oenothera, linseed, blackcurrant, hemp seed, black cumin seed and borage, gain some theoretical knowledge about rheology, learn how to use rotational rheometer and establish long lasting cooperation between Institute of Hydrodynamics of The Czech Academy of Science and AGH University of Science and Technology.

The main research goal was to characterize oils, which will be used in electrospun patches for atopic skin treatment. Fatty acids are found in many oils and they can be used as moisturizers in atopic skin. The viscosity of them is important characteristic for modeling the oil flow in the electrospun fibers and it is necessary for further research.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

Literature research on the topic of natural substances for treatment atopic skin was carried out at the beginning of the STSM. After literature research and also discussion with the medical doctor of dermatology 6 oils were chosen.

The rheological measurements were carried out with a Physica MCR 501 rotational rheometer (Anton Paar, Austria) equipped with concentric cylinders (26.6/28.9 mm inner/outer diameters). The oils were measured in steady shear modes at different temperatures: 20, 27.5, 35 and 40°C. Measurement for each oil was repeated three times at each temperature. The average viscosity for oils were calculated.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

Steady shear viscosity was measured for oenothera, linseed, blackcurrant, hemp seed, black cumin seed and borage oil at different temperatures Fig.1. In all cases, the Newtonian character of the individual oils was observed. The viscosity of oils have been found to decrease with the increase in temperature, see Fig. 2..

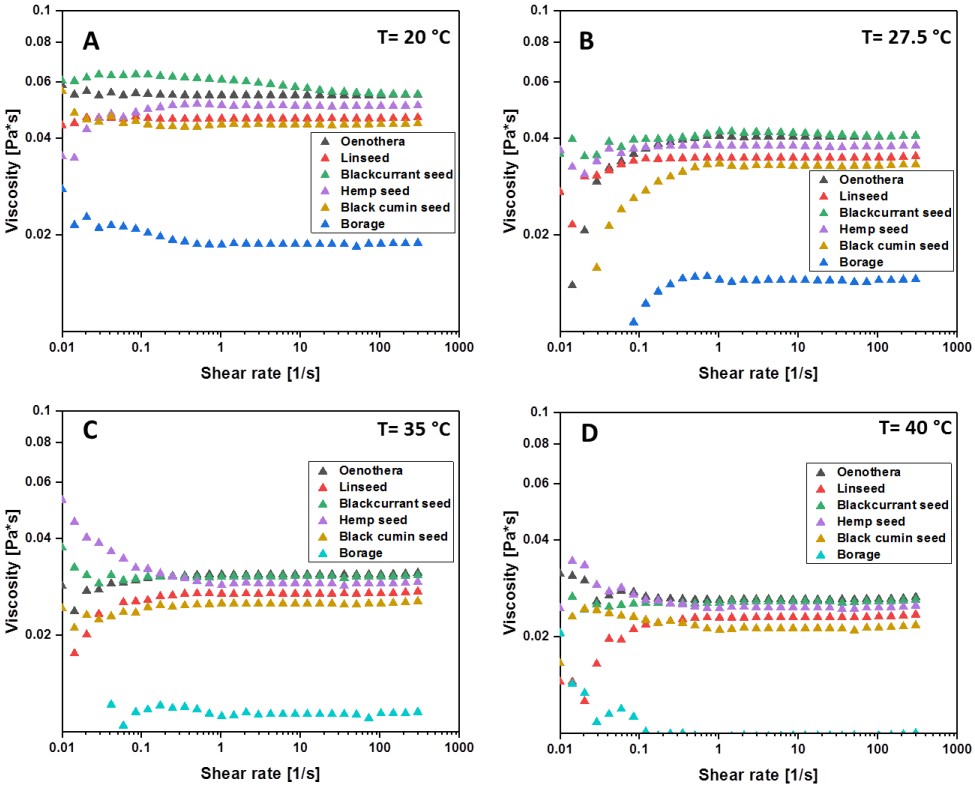
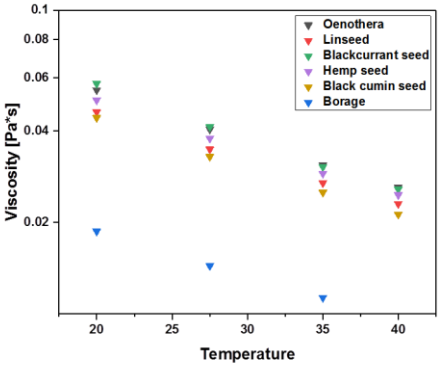


Fig. 1 Relative viscosity in dependence on shear rate for different oils at the temperature: A) 20 °C, B) 27.5 °C, C) 35 °C and D) 40 °C.



Temperature [°C]	Viscosity of oil [mPa*s]					
	Oenothera	Linseed	Blackcurrant seed	Hemp seed	Black cumin seed	Borage
20	54.6	46.2	57.3	50.6	44.3	18.7
27.5	40.6	34.9	41.3	37.8	32.9	14.4
35	31.0	27.0	30.5	29.0	25.1	11.3
40	26.2	23.0	25.7	24.7	21.3	9.8

Fig. 2 Average viscosity of oils presented on the graph and in the table.

FUTURE COLLABORATIONS (if applicable)

This research will be used for further investigation of electrospun patches for atopic skin treatment. Results obtained during this STSM will be published in two scientific papers later this year.