1. Raziskovalna organizacija (*Research organisation)*:

Univerza v Ljubljani, *Biotehniška fakulteta*

2. Ime in priimek mentorja (*Name and surname of a mentor*):

ROMANA MARINŠEK LOGAR

3. Področje znanosti iz šifranta ARRS (*Primary research field*):

4. BIOTEHNIKA, 4.06 Biotehnologija, 4.06.04 Mikrobna biotehnologija

5. Kontaktni e-naslov mentorja (*Contact of a mentor)*:

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5. Kratek opis programa usposabljanja (*Short description of the program)*:

ANAEROBNA METANOGENA RAZGRADNJA AGROŽIVILSKIH ODPADKOV, KI VSEBUJEJO KERATIN, KOLAGEN, LANOLIN IN LIGNOCELULOZO

Nekateri agroživilski odpadki (ovčja volna, perutninsko perje, drugi klavni odpadki) poleg lignoceluloze vsebujejo večje količine keratina, kolagena in lanolina, ki predstavljajo težje razgradljive polimerne snovi za predelavo v bioplin.
Mladi raziskovalec (MR) bo v anaerobnem CSTR bioreaktorju vzpostavil biotehnološki proces anaerobne metanogene razgradnje odpadne ovčje volne, ki ga bo z inženirskimi in mikrobnimi parametri reguliral tako, da se bo mikrobna združba obogatila s keratinolitičnimi in lignocelulolitičnimi bakterijami. Cilj anaerobne razgradnje ne bo le proizvodnja bioplina, ampak tudi čim večja proizvodnja encimov keratinaz (serinske in metaloproteaze), kar je visoka dodana vrednost procesa. Keratinaze so robustni, industrijsko pomembni encimi in jih predvidoma lahko izoliramo že iz supernatanta reaktorskega digestata, kar bo MR tudi preizkusil.
Produkcijo bioplina bo MR spremljal z merilno tehniko, ki je integrirana v bioreaktor, delež metana s plinsko kromatografijo in vmesne razgradne produkte s plinsko kromatografijo kratkoverižnih maščobnih kislin. Premike v mikrobni združbi (bakterije in arheje) bo sledil s sodobnimi molekularnimi tehnikami (TRFLP, DGGE). Fokus raziskovanja bodo tiste keratinolitične bakterije, ki bodo izražale najbolj aktivne keratinaze. Izbrane keratinolitične bakterije bo identificiral s sodobnimi molekularnimi tehnikami (klonska knjižnica, sekvenciranje) in z biokemijskimi metodami (elektroforeza, kromatografije) raziskal njihove keratinaze. Razvil bo tudi postopek za ekstrakcijo keratinaz, s čimer bo vzpostavljen osnovni postopek za proizvodnjo keratinaz za industrijsko rabo (industrija krmil, usnjarstvo, bioplinska produkcija, industrija volne in svile, proizvodnja biognojil…).

ANAEROBIC METHANOGENIC DEGRADATION OG AGRIFOOD WASTE, CONTAINING KERATIN, COLLAGEN, LANOLIN AND LIGNOCELLLULOSE

Some of the agri-food waste (sheep wool, feathers, poultry, other slaughter waste) in addition to the lignocellulose contain large amounts of keratin, collagen and lanolin, which represent persistant and not easily degradable polymer materials for processing into biogas.
The young researcher (YR) will set up a biotechnological process of methanogenic anaerobic decomposition of waste sheep wool in anaerobic CSTR bioreactor, which will be regulated by engineering and microbial parameters so that the microbial community will be enriched by keratinolytic and lignocellulolytic bacteria. The aim of anaerobic degradation is not only biogas production, but also to maximize the production of enzymes keratinases (serine and metalloproteases), what is a high added value of the process. Keratinases are robust, industrially important enzymes and are likely to be already isolated from the supernatant of the reactor digestate, which will also be tested by YR.
Production of biogas will be monitored by measurement technique, which is integrated in the bioreactor, the proportion of methane will be followed by gas chromatography and intermediate decomposition products by gas chromatography determined short-chain fatty acids. Shifts in microbial communities (bacteria and archaea) will be followed by modern molecular techniques (TRFLP, DGGE). The focus of research will be the keratinolytic bacteria, which will express the most active keratinases. Selected keratinolytic bacteria will be identified with modern molecular techniques (clones library, sequencing) and biochemical methods (electrophoresis, chromatography) will be applied to explore and characterise their keratinases. YR will develop a process for the extraction of keratinases, thus creating a basic process for their production for industrial use (feed production, leather, biogas production, the industry of wool and silk, production of biofertilisers ...).