TO MAGNIFICO RETTORE OF UNIVERSITA' DEGLI STUDI DI MILANO ID CODE ____5925_____

I the undersigned asks to participate in the public selection, for qualifications and examinations, for the awarding of a type B fellowship at **the Department of Pharmaeutical Science___**

Scientist- in – charge: **____Prof. Lammi Carmen __**

[Name and surname]

CURRICULUM VITAE

PERSONAL INFORMATION

Surname	Singh
Name	Aishwarya

PRESENT OCCUPATION

Appointment	Institute
Senior Project Associate	CSIR-Institute of Himalayan Bioresource Technology

EDUCATION AND TRAINING

Degree	Course of studies	University	year of achievement of the degree
Degree	Ph.D	Regional Centre for Biotechnology	2023
Specialization	Biocatalysis, enzyme immobilization, biomass valorization	--	--
PhD	Biotechnology	Regional Centre for Biotechnology	2023
Master	Botany	University of Allahabad	2017
Degree of medical	N/A	--	--

specialization			
Degree of European specialization	N/A	--	--
Other	N/A	--	--

TRAINING OR RESEARCH ACTIVITY

My doctoral study was on enzyme based process to produce rare sugars from agro-biomass

Two recombinant proteins L-ribose isomerase (L-RI) and L-arabinose isomerase (L-AI) were immobilized on various nano supports like GOx, MWCNT, MCM-41 and SBA-15 and developed the micro-composite construct (DEMC@L-AI+L-RI).The immobilization process was carried out by different methods to augment the immobilization efficiency, activity recovery after reusability and biocatalytic activity. The most feasible method of immobilization recognized in the present study was covalent linkage for carbon based nanomaterial and nano silica because of their surface functionalization by carbodiimide chemistry. Moreover, the enzyme loading capacity was higher in GOx and MWCNT than MCM-41 and SBA-15. These activated nano supports linking protein moieties were used for the synthesis of rare sugars D-talose and L-ribose from D-tagatose and L-ribulose, respectively. In addition to this, a proficient biocatalyst was developed using enzyme L-RI and L-AI and cobalt metal ion (Co^{2+}) as a co-factor in a catalytic reaction. The developed micro composite construct enclosing metal linked enzyme has evidenced the increased immobilization efficiency with moderate enzyme loading.

The immobilized nanobiocatalyst was additionally characterized to validate the linkage of enzyme with different nano supports via various analytical techniques. The developed and immobilized biocatalyst serves countless benefits in enhancing the enzyme efficacy, improving the reaction kinetics, reusability, upholding the activity recovery and storage stability of enzymes. Furthermore, the duo enzyme consortium was found to be effective in bioconversion of biomass derived sugars D-galactose from onion waste residue and L-arabinose from beetroot pomace into rare sugars D-talose and L-ribose respectively via a linear enzyme cascade mechanism. The overall yield of rare sugars D-talose and L-ribose was 14-15% and 20-22% respectively from pure sugars as well as from biomass derived sugars. This study has explained that the developed nanobiocatalyst ascertains the sustainable biocatalytic transformation of simple sugars into rare sugars.

Moreover my present work is on the optimization process of Himalayan extremozymes for biomass valorization and depolymerization. In this work, diffrent microbial strians are screened to produce

hydrloytic enzymes to depolymerise the recalcitrant cellulose structure present in biomass.

PROJECT ACTIVITY

Year	Project
2018-2020	Setting up of secondary agriculture/ food processing and entrepreneurial network in Punjab
2020-2021	Complete utilization of whey for the production of whey protein hydrolysate, bacterial cellulose and tagatose for various food applications

PUBLICATIONS

Research papers
Singh, A., & Yadav, S. K. (2023). Immobilization of L-ribose isomerase on the surface of activated mesoporous MCM41 and SBA15 for the synthesis of L-ribose. *Journal of Biotechnology*, *362*, 45-53.
Rai, S. K., **Singh, A**., Kauldhar, B. S., & Yadav, S. K. (2023). Robust nano-enzyme conjugates for the sustainable synthesis of a rare sugar D-tagatose. *International Journal of Biological Macromolecules*, *231*, 123406.
Singh, A., Rai, S. K., & Yadav, S. K. (2022). Metal-based micro-composite of L-arabinose isomerase and L-ribose isomerase for the sustainable synthesis of L-ribose and D-talose. *Colloids and Surfaces B: Biointerfaces*, 112637.
Singh, A., Rai, S. K., Manisha, M., & Yadav, S. K. (2021). Immobilized L-ribose isomerase for the sustained synthesis of a rare sugar D-talose. *Molecular Catalysis*, *511*, 111723.
Rai, S. K., Kaur, H., **Singh, A**., Kamboj, M., Jain, G., & Yadav, S. K. (2021). Production of d-tagatose in packed bed reactor containing an immobilized l-arabinose isomerase on alginate support. *Biocatalysis and Agricultural Biotechnology*, *38*, 102227.

Articles in reviews
Hussain, I., Singh, A., Singh, N. B., **Singh, A**., & Singh, P. (2019). Plant-nanoceria interaction: Toxicity, accumulation, translocation and biotransformation. *South African Journal of Botany*, *121*, 239-247.
Books
Singh, A., Hussain, I., Afzal, S., **Singh, A**., & Singh, N. B. (2021). Circadian regulation of abiotic stress tolerance in legumes. In *Abiotic Stress and Legumes* (pp. 105-136). Academic Press.

Declarations given in the present curriculum must be considered released according to art. 46 and

47 of DPR n. 445/2000.

The present curriculum does not contain confidential and legal information according to art. 4, paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

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Place and date: _____Prayagraj, India_____, _____10/11/2023_____

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