

Stanford



Nils Averesch

Research Engineer

Civil and Environmental Engineering

Bio

BIO

Dr. Nils Averesch is Research Engineer with the Department of Civil and Environmental Engineering, and Co-Investigator of the NASA-sponsored 'Center for Utilization of Biological Engineering in Space' (CUBES). Supported by the Stanford Natural Gas Initiative (NGI), Nils works on enabling the biomanufacturing of consumable and durable goods from the greenhouse gases carbon dioxide and methane. More specifically, Nils' work comprises the rational design and optimization of biochemical pathways for increased carbon-efficiency and construction of microbial cell factories for production of advanced polymeric biomaterials. By developing circular bioproduction platforms that can support human long-duration space-exploration missions, Nils' aims to transform Earth's chemical industry into a sustainable bioeconomy "on the way" to new frontiers.

Before joining Stanford, Nils was a contract researcher at NASA Ames Research Center (California) as Associate Scientist with Universities Space Research Association (USRA), where he led the Synthetic Biology task. Nils holds a PhD in Metabolic Engineering from the University of Queensland (Australia) and an engineer's degree (Dipl. Ing.) in Biochemical Engineering, from the Technical University of Dortmund (Germany).

ACADEMIC APPOINTMENTS

- Research Engineer, Civil and Environmental Engineering

LINKS

- Center for the Utilization of Biological Engineering in Space: <http://cubes.space/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

metabolic engineering for production of high-performance bio-polyesters from CO₂

PROJECTS

- Production of high-strength bio-polymers from next-generation C1-feedstocks - Stanford University / CUBES (December 17, 2018)

Publications

PUBLICATIONS

- **Building Synthetic Cells#From the Technology Infrastructure to Cellular Entities.** *ACS synthetic biology*
Rothschild, L. J., Averesch, N. J., Strychalski, E. A., Moser, F., Glass, J. I., Cruz Perez, R., Yekinni, I. O., Rothschild-Mancinelli, B., Roberts Kingman, G. A., Wu, F., Waeterschoot, J., Ioannou, I. A., Jewett, et al
2024

- **Space bioprocess engineering as a potential catalyst for sustainability** *NATURE SUSTAINABILITY*
Vengerova, G., Lipsky, I., Hutchinson, G. A., Averesch, N. H., Berliner, A. J.
2024; 7 (3): 238-246
- **Microbial biomanufacturing for space-exploration-what to take and when to make.** *Nature communications*
Averesch, N. J., Berliner, A. J., Nangle, S. N., Zezulka, S., Vengerova, G. L., Ho, D., Casale, C. A., Lehner, B. A., Snyder, J. E., Clark, K. B., Dartnell, L. R., Criddle, C. S., Arkin, et al
2023; 14 (1): 2311
- **Toward sustainable space exploration: a roadmap for harnessing the power of microorganisms.** *Nature communications*
Santomartino, R., Averesch, N. J., Bhuiyan, M., Cockell, C. S., Colangelo, J., Gumulya, Y., Lehner, B., Lopez-Ayala, I., McMahon, S., Mohanty, A., Santa Maria, S. R., Urbaniak, C., Volger, et al
2023; 14 (1): 1391
- **Cultivation of the Dematiaceous Fungus Cladosporium sphaerospermum Aboard the International Space Station and Effects of Ionizing Radiation.** *Frontiers in microbiology*
Averesch, N. J., Shunk, G. K., Kern, C.
2022; 13: 877625
- **Space bioprocess engineering on the horizon** *Communications Engineering*
Berliner, A. J., Lipsky, I., Ho, D., Hilzinger, J. M., Vengerova, G., Makrygiorgos, G., McNulty, M. J., Yates, K., Averesch, N. J., Cockell, C. S., Wallentine, T., Seefeldt, L. C., Criddle, et al
2022; 1
- **Towards a Biomanufactory on Mars** *FRONTIERS IN ASTRONOMY AND SPACE SCIENCES*
Berliner, A. J., Hilzinger, J. M., Abel, A. J., McNulty, M. J., Makrygiorgos, G., Averesch, N. H., Sen Gupta, S., Benvenuti, A., Caddell, D. F., Cestellos-Blanco, S., Doloman, A., Friedline, S., Ho, et al
2021; 8
- **Choice of Microbial System for In-Situ Resource Utilization on Mars** *FRONTIERS IN ASTRONOMY AND SPACE SCIENCES*
Averesch, N.
2021; 8
- **Anodic electro-fermentation: Empowering anaerobic production processes via anodic respiration.** *Biotechnology advances*
Vassilev, I., Averesch, N. J., Ledezma, P., Kokko, M.
2021; 107728
- **Editorial: Biotechnological Production and Conversion of Aromatic Compounds and Natural Products.** *Frontiers in bioengineering and biotechnology*
Averesch, N. J., Kayser, O. n.
2020; 8: 646
- **Metabolic engineering of *Bacillus subtilis* for production of para-aminobenzoic acid - unexpected importance of carbon source is an advantage for space application** *MICROBIAL BIOTECHNOLOGY*
Averesch, N. H., Rothschild, L. J.
2019; 12 (4): 703-14
- **Metabolic Network Analysis of Microbial Methane Utilization for Biomass Formation and Upgrading to Bio-Fuels** *FRONTIERS IN ENERGY RESEARCH*
Averesch, N. H., Kracke, F.
2018; 6
- **Metabolic Engineering of the Shikimate Pathway for Production of Aromatics and Derived Compounds-Present and Future Strain Construction Strategies** *FRONTIERS IN BIOENGINEERING AND BIOTECHNOLOGY*
Averesch, N. H., Kroemer, J. O.
2018; 6: 32
- **Toward Synthetic Biology Strategies for Adipic Acid Production: An in Silico Tool for Combined Thermodynamics and Stoichiometric Analysis of Metabolic Networks** *ACS SYNTHETIC BIOLOGY*
Averesch, N. H., Martinez, V. S., Nielsen, L. K., Kromer, J. O.
2018; 7 (2): 490-509
- **Enhanced production of para-hydroxybenzoic acid by genetically engineered *Saccharomyces cerevisiae*** *BIOPROCESS AND BIOSYSTEMS ENGINEERING*

- Averesch, N. H., Prima, A., Kroemer, J. O.
2017; 40 (8): 1283-1289
- **Quantitative analysis of aromatics for synthetic biology using liquid chromatography** *Biotechnology Journal*
Lai, B., Plan, M. R., Averesch, N. J., Yu, S., Kracke, F., Lekieffre, N., Bydder, S., Hodson, M. P., Winter, G., Krömer, J. O.
2017; 12 (1)
 - **Discrimination of wild types and hybrids of *Duboisia myoporoides* and *Duboisia leichhardtii* at different growth stages using H-1 NMR-based metabolite profiling and tropane alkaloids-targeted HPLC-MS analysis** *PHYTOCHEMISTRY*
Ullrich, S., Averesch, N. H., Castellanos, L., Choi, Y., Rothauer, A., Kayser, O.
2016; 131: 44-56
 - **Production of para-aminobenzoic acid from different carbon-sources in engineered *Saccharomyces cerevisiae*** *MICROBIAL CELL FACTORIES*
Averesch, N. H., Winter, G., Kromer, J. O.
2016; 15: 89
 - **Quorum-sensing linked RNA interference for dynamic metabolic pathway control in *Saccharomyces cerevisiae*** *METABOLIC ENGINEERING*
Williams, T. C., Averesch, N. H., Winter, G., Plan, M. R., Vickers, C. E., Nielsen, L. K., Kroemer, J. O.
2015; 29: 124-134
 - **Tailoring strain construction strategies for muconic acid production in *S. cerevisiae* and *E. coli*.** *Metabolic engineering communications*
Averesch, N. J., Kromer, J. O.
2014; 1: 19-28
 - **In vivo instability of chorismate causes substrate loss during fermentative production of aromatics** *YEAST*
Winter, G., Averesch, N. H., Nunez-Bernal, D., Kroemer, J. O.
2014; 31 (9): 333-341
 - **Assessing Heterologous Expression of Hyoscyamine 6 beta-Hydroxylase - a Feasibility Study**
Averesch, N. H., Kayser, O., Duc, N. M., Elfahmi, Wirasutisna, K. R., Sukrasno, Suganda, A. G., Abe, Petersen, M., Insanu, Hartati, R., Pramastyta, H., Julianti, E., Fisher, N.
ELSEVIER SCIENCE BV.2014: 69-78
 - **Production of aromatics in *Saccharomyces cerevisiae*-A feasibility study** *JOURNAL OF BIOTECHNOLOGY*
Kroemer, J. O., Nunez-Bernal, D., Averesch, N. H., Hampe, J., Varela, J., Varela, C.
2013; 163 (2): 184-193
 - **Organosoluble enzyme conjugates with poly(2-oxazoline)s via pyromellitic acid dianhydride** *JOURNAL OF BIOTECHNOLOGY*
Konieczny, S., Fik, C. P., Averesch, N. H., Tiller, J. C.
2012; 159 (3): 195-203