



Nikita Hanikel Photo: David Ausserhofer

Water harvesting from the air with molecular sponges

1st prize in the natural and technical sciences section

Nikita Hanikel holds a PhD in chemistry from the University of California (Berkeley).

Water is essential to life. However, about two-thirds of the world's population experience water scarcity every year. To remedy the situation, innovative methods of water treatment and extraction are required. A promising and decentralized

strategy is water extraction from the air. To enable this without time and space restrictions and with minimal energy consumption, I incorporated metal-organic frameworks into this process. These are "molecular sponges" with nanometer-sized pores that are able to absorb moisture from dry air and, after mild warming, release it as concentrated, easily condensable water vapor. I was primarily concerned with the development and synthesis of these compounds and the molecular understanding of the water absorption in these materials. Additionally, I have successfully used these scaffolding connections for "water harvesting" in the Mojave Desert, California

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Abstract of the competition entry

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Abstract of the competition entry

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Wasserernte mit molekularen Schwämmen



Wasser ist lebensnotwendig. Jedoch machen etwa zwei Drittel der Weltbevölkerung jährliche Erfahrungen mit Wasserknappheit. Um Abhilfe zu schaffen, werden innovative Methoden zur Wasseraufbereitung und -gewinnung benötigt. Eine vielversprechende und dezentrale Strategie ist die Wassergewinnung aus der Luft. Um dies ohne zeitliche und räumliche Restriktionen sowie unter minimalem Energieverbrauch zu ermöglichen, habe ich metallorganische Gerüstverbindungen in diesen Vorgang eingebunden. Dies sind „molekulare Schwämme“ mit Nanometer großen Poren, welche in der Lage sind, Feuchtigkeit aus trockener Luft aufzunehmen und diese nach mildem Aufwärmen als konzentrierten, leicht kondensierbaren Wasserdampf abzugeben. Primär habe ich mich mit der Entwicklung und Synthese dieser Verbindungen sowie dem molekularen Verständnis der Wasseraufnahme in diese Materialien beschäftigt. Zusätzlich habe ich diese Gerüstverbindungen erfolgreich zur „Wasserernte“ in der Mojave-Wüste, Kalifornien, verwendet.

Nikita Hanikel promovierte an der Universität von Kalifornien, Berkley im Fachgebiet Chemie.

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Deutscher Studienpreis
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WINNERS OF THE 2023 IUPAC-SOLVAY INTERNATIONAL AWARD FOR YOUNG CHEMISTS

29 Apr 2023

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The International Union of Pure and Applied Chemistry and Solvay announce the winners of the 2023 [IUPAC-Solvay International Award for Young Chemists](#), presented for the best Ph.D. theses in the chemical sciences, as described in 1000-word essays.



The five winners are:

- Dr. Eduard Bobylev (Ukraine, Netherlands), Ph.D., University of Amsterdam, Netherlands
- Dr. Craig Day (Canada, Spain), Ph.D., Rovira i Virgili University, Spain [\[@TheCraigDay | ORCID | LinkedIn\]](#)
- Dr. Nikita Hanikel (Germany, USA), Ph.D., University of California Berkeley, USA
- Dr. Apurva Panjla (India), Ph.D., Indian Institute of Technology, Kanpur, India [\[@Apurva19966342 | LinkedIn\]](#)
- Dr. Yu Zheng (China/Beijing/USA) Ph.D., Stanford University, USA



Bobylev



Day



Hanikel



Panjla



Zheng

The winners will each receive a cash prize of USD 1000 and travel expenses to the [49th IUPAC World Chemistry Congress](#), 20-25 August 2023, in The Hague, The Netherlands. Each winner will also be invited to present a poster at the IUPAC Congress describing his/her award-winning work and to submit a short critical review on aspects of his/her research topic, to be published in *Pure and Applied Chemistry*. The awards will be presented to the winners of the 2022 and 2023 competitions during the Opening Ceremony of the Congress.

The titles of the winners' theses are:

- Dr. Eduard Bobylev: “Spherical coordination-based MnL₂n assemblies: construction, confinement, catalysis and bio application”
- Dr. Craig Day: “Understanding Nickel Catalysis at the Molecular Level: Insights into C-O Functionalization and Electron Transfer Events”
- Dr. Nikita Hanikel: “Atmospheric Water Harvesting with Metal–Organic Organic Frameworks”

[eTOC Alert 'Pure and Applied Chemistry' – April 2023](#) 26 May 2023

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- Dr. Apurva Panjla: "Therapeutic Potential of Short Peptide Conjugates as Novel Antibiotics and Osteoinductive Agents"
- Dr. Yu Zheng: "Molecular design of polymer semiconductors for skin-inspired electronics"

There were 58 applications from individuals receiving their Ph.D. degrees from institutions in 21 countries. The award selection committee, chaired by Professor Christopher Brett, IUPAC Past President, comprised members of the IUPAC Bureau and a senior science advisor from Solvay, all of whom have a wide range of experience in chemistry.

In view of the many high-quality applications, the Committee also decided to award four Honorable Mentions to:

- Dr. Yuanxin Deng (China/Beijing/Netherlands), Ph.D., University of Groningen, Netherlands
- Dr. Karthick Govindan (India, China/Taipei), Ph.D., Kaohsiung Medical University, China/Taipei
- Dr. Renyu Guo (China/Beijing, USA), Ph.D., Indiana University Bloomington, USA
- Dr. Aron Peter (Hungary, UK), Ph.D., University of Manchester, UK

The call for applications for the 2024 IUPAC-Solvay International Award for Young Chemists will open soon. Eligible candidates must have received a Ph.D. or equivalent degree in any of the countries that have National Adhering Organizations in IUPAC during the year 2023.

< [see originating call](#)

Announcement published in [Chem Int July 2023](#), p. 22

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