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Kemilärarnas resurscentrum
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Stockholms universitet

Zooma med en kemidoktorand – HT25

Biokemi

B1	**Turning bacteria into factories** Through genetic engineering, we can transform bacteria into miniature factories of chemicals. We can grow them in fermenters to harvest chemicals such as enzymes, hormones, medicines, detergents and many more. I want to show what work with bacterial employees looks like, and how we address the problems when they don't work as well as we want.
B2	**Molecular design with AI helps solve societal problems** This talk will give an introduction to functional protein and enzyme design to tackle societal problems, such as plastic pollution, therapeutics development, green chemistry and sustainable catalysis. In particular, for advancements in computer-assisted protein design David Baker was awarded a Nobel Prize last year, which highlights the importance of designing on-demand proteins and enzymes with non-natural functionalities. Nowadays, with machine learning and artificial intelligence approaches we can design vaccines, construct complicated artificial chemical cascades to better understand the biology of the cell and to even create enzymes that readily degrade plastics! With these exciting advancements we're entering a new era, where we can address the longstanding problems of humanity that remained unsolved for decades.

Fysikalisk kemi

F1	**How laser light affects DNA and silver nanoparticles** Tiny structures made from DNA and silver atoms can be designed to have interesting interactions with light. In my talk, I'll show how we can use laser light to explore and understand these materials.
F2	**What light can tell us about the smallest things in life** I will talk about how my research group uses colours to create and track changes in materials. And why this is important.
F3	**Why one can both sink in and walk on quicksand** After a quick introduction on the field of rheology, I will present a current dilemma when it comes to determining whether a given viscoelastic material should be categorized as either solid-like or liquid-like. Finally, an open question will be presented, to stimulate thinking and curiosity among the listeners.

Geokemi/Miljökemi

G1	**Kemikalier i vardagen** Kemikalier är en självklar del i vardagen. Men hur ser vi till att de inte orsakar problem för miljön eller oss själva? Min forskning handlar hur kemikalier regleras för att begränsa risken för att de orsakar problem i vardagen.
G2	**The Secret Life of Ice** You might instinctively think that ice is just frozen water: inert, unreactive, boring, and lifeless. But if you stop for a moment, and look a little closer, you will learn that within ice itself, extraordinary chemistry is at play. You will see tiny "microreactors" within ice that

	actively transform everyday rust minerals into useful iron ions that are necessary for life as we know it. With our warming climate, these icy environments are melting more often, so understanding this secret chemical dance becomes timely and critical. This surprising chemistry directly affects the release of iron, carbon, and other compounds, which possibly affects the future of our planet.
G3	**AI-powered chemical sniffer dogs** Think of an early warning system (EWS) as a chemical sniffer dog, but in an AI-powered form. It sniffs through mountains of data, such as patents and grey literature, identifies potential troublemakers and ranks them according to how likely they are to endanger people or the environment. Chemicals are everywhere around us and their full safety profiles are still unknown. Our project uses artificial intelligence (AI) to automatically detect potentially harmful chemicals and provide regulators and researchers with an early warning list by classifying chemicals based on their potential hazard.

Materialkemi

M1	**Elektrokemiska metoder för hållbar batteriåtervinning** Litiumjonbatteriet är en viktig komponent i datorer, elbilar och mobiltelefoner. Metaller som litium, nickel och kobolt i uttjänta batterier behöver återvinnas men konventionella metoder är tekniskt begränsade och leder till miljöpåverkan. Detta projekt fokuserar på elektrodialys - en lovande metod som kräver mindre skadliga kemikalier och ger färre restprodukter.
M2	**A laboratory in your hand** This talk gives an overview of how various chemical and biological lab tests can be miniaturized into lab-on-a-chip systems. These lab-on-a-chip systems enable the chemical analysis on-site and on-time where the patient is being treated and where the pollution has to be detected.
M3	**The cosmos of unknown plastic chemicals** Thousands of chemicals are used to give plastic products their unique and diverse properties that make our modern life(style) possible. But, can these chemicals be released, and what happens when they are? This is largely unknown and the focus of ongoing research. One thing that is clear: solar radiation can break down plastic chemicals into unknown structures with unknown risks.

Organisk kemi

O1	**Using old tricks to start a Green Revolution** Organic synthesis drives our society with life-saving medicines and crop-boosting fertilizers. But the climate crisis demands action. With a growing population, our strain on our resources is growing ever larger, thus as synthetic organic chemists, we hold the key to change. Join me on an exhilarating exploration of synthetic organic chemistry's impact. Uniting academia and industry, I'll unveil cutting-edge techniques addressing our unsustainable practices in synthetic chemistry. Together, let's envision a future where sustainable organic synthesis powers a harmonious society.
O2	**A computational look at chemical reactions** In this talk, I will introduce computational chemistry, explain why reaction mechanisms are important and show an example where mechanistic insights have contributed to reaction design.

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