

How I became an ERC StG recipient



assoc. prof. **Nejc Hodnik**

Head of Laboratory for ElectroCatalysis (ElectroCat)
Department of Materials Chemistry, National Institute of Chemistry,
Hajdrihova 19, 1000 Ljubljana, Slovenia
nejc.hodnik@ki.si, @Electrocatalyst (Twitter)

How it started...

- Thrown into the world of Slovenian "academic circles" with no idea what I was getting myself into...
- After several years of PhD study, I still had no idea - no one has discussed a career plan with me as a scientist (not even that there is a program for automatically adding references to the manuscript ☺).
- In 2010-2011 I went to Max-Planck in Düsseldorf where I was met young and successful people who showed me what we are "chasing" in a scientific career.
- Learned what is the lead and corresponding author, impact factors, projects, Marie Curie, background and stories about our community (who is in bad relations with whom, who stole someone's idea, what are the "hot" topics, etc.)



How it continued...

- I came back from Germany and immediately started publishing articles
- I managed to complete my PhD studies and published 5 articles so that I could apply to Marie Curie IEF (now Marie Skłodowska-Curie)
- Due to the financial situation they simply couldn't hire me, I had no choice but to go for postdoc if I wanted to stay in academia
- I'm still not sure if I want to be a scientist - but I'm interested and it's a challenge...
- The alternative was going back to filming "funny" videos (I didn't see that as a sustainable job - maybe I made a mistake when I look back and see what happened to the internet 😊)
- Wrote Marie Curie project...

How it continued...

- **½ salary for few months in SLO**
- **Got Marie Curie!**
- **Got a baby!**
- Moved to Germany
- Tried to effectively combine work and family – hard!
- Had one crazy idea that actually worked -> Nature Communications! And some more articles...
- Came back to Slovenia! Thanks for the retirement mentor!
- Quickly got SLO postdoc project...



How it continued...

- I already went to the ERC workshop in Germany - for fun because it was in Bohn in 2015 (as a postdoc) where I learned from ERC holder that ERC project is like writing a Science paper. Once you are finished you will completely rewrite it 10 times! Wow!
- Of course, I never thought I would be applying to the ERC
- In 2016 when I moved to Slovenia, I began to seriously consider it when I saw extraordinary response to my Nature Communication – recycling.
- Later I was on a few workshops in Slovenia – also super useful – met exhausted prof. Matevž Dular who few months later got ERC CoG. I also met some other co-sufferers (Tušek, Humar, ...).
- I created the idea for the ERC back in 2016...
- I finally decided to apply in 2017 - what do I have to lose (besides my dignity 😊)
- Meanwhile, I was 10/0 with EU projects - apparently I don't know how to choose good consortia or they me (now I'm improving...)

How it continued...

- I only reached an interview - which is already a great success (was told)!
- But I got ARRS complementary project!
- Next year I took advantage of the ARRS funding for 3 month visit of ERC PI - in Italy it was interesting to see a different topic and culture of laboratory management...but high level science!
- The institute paid me a firm that helped me write... fine to understand what the ERC is looking for..." your breakthrough idea"
- What was important was that I had time to write - I was alone (family visit only for 2 weeks)! So it was like a mini sabbatical.
- I only reached an interview - which is already a great success (was told and motivated)!
- Next year I got another child – so I the last chance to try again 😊



How to start: gather information, experience and go to all possible workshops

- Important to understand the spirit of what ERC and that it is high-risk high-gain, but...
- When you get too much advice, they slowly start to contradict each other: „too many grandmothers - a deformed child“
- It's the same with the advice of a consulting company!!
- In the end, you have to listen to yourself and trust yourself (it is your idea...)

If you are around ERC PI every day for few months you can see what it takes to be a leader (good and bad),... visiting and mentorship! Networking is super important to build a strong circle of trust on EU level or broader... Talk to other ERC holders!!!!

Photo by [jurvetson](#)



How to get a good ERC idea?

- I put everything I had in a pile and saw if it forms a meaningful story.
- Then I had to write it myself at least three times before it "looked"...
- Then you start testing how solid the idea is - alone or with the help of colleagues and a firm – remember that this is subjective!
- In the end, you feel if it's good or not - well, at least that's how it is for me. Again subjective! 😊

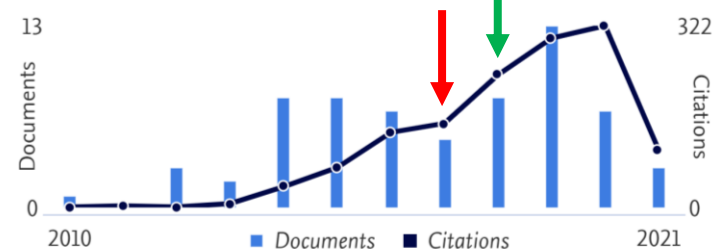


Photo by [jurvetson](#)

What to consider

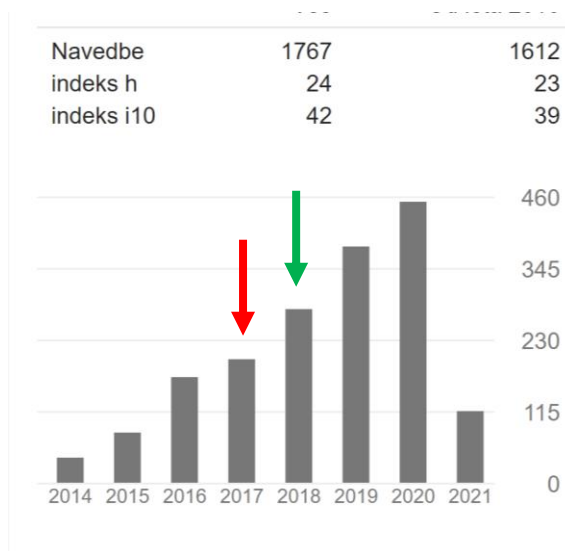
- The topic is defined by your doctorate and postdoctoral experience...
- Have as many publications as possible where you are the main or leading author!
- As many articles as possible with a high IF and, of course, citations – similarly also as good as possible CV (invited lectures, other activities, teaching, ...)!
- Know your field and what the hot topics are - where leading researchers in the field (reviewers) expect breakthroughs
- **Don't offer them something too new (crazy) and something that contradicts existing beliefs - balance between popular and breakthrough (give them what they want so they can see you can do it and then you can still do what you really believe is important) - this is the unofficial game of science!**
- It is extremely beneficial to be in contact with people who are more successful than you and who are a step ahead of you in your career - learn!
- When you have time, polish, polish, polish, ...

Document & citation trends



Publications (statistics): 35 peer-reviewed papers (plus 3 under review), 2 cover pages, 1 patent (US), 1 patent application (EU); Details: **12 as 1st author, 21 as corresponding author (plus 4 submitted), cited 359 and h-index 12** (by Scopus on 16.10.2017), only 8 papers with PhD supervisor Dr. Stanko Hočevar

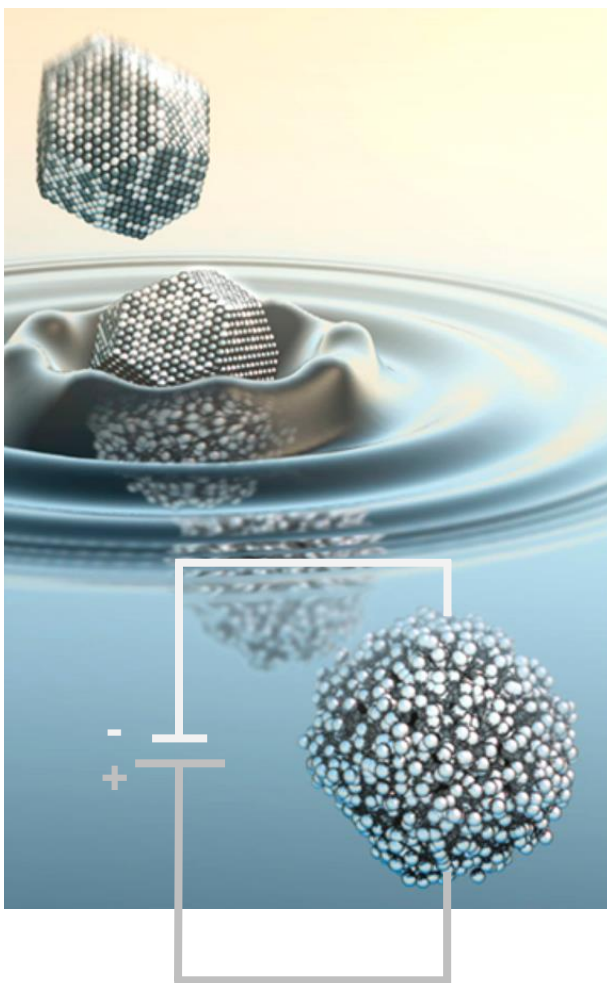
Publications (statistics): 41 peer-reviewed papers (plus 3 under review), 2 cover pages, 1 patent (US), 2 international patent applications; Details: **12 as 1st author, 28 as corresponding author, cited 571 and h-index 15** (by Scopus on 16.10.2018), only 8 papers with PhD supervisor Dr. Stanko Hočevar.



What to consider

- In the end, this is your project and you have to believe in it.
- You won't lose the time you invested because you can use it for other projects and what's even more important... by writing it and really thinking about it, you can now really see where your career is going thematically.
- 20/80 doesn't work - you're wasting time*. Only 120/100!
- But what are you going to do in the academy... why are you here, if not for playing that („hunger or squid“) game?!
- If you want money and security, go into industry! 😊

Towards Nanostructured Electrocatalysts with Superior Stability



Dr. Nejc Hodnik, Assoc. Prof.

*Electrocatalysis Group Leader
(2 PhD students, 3 postdocs)*



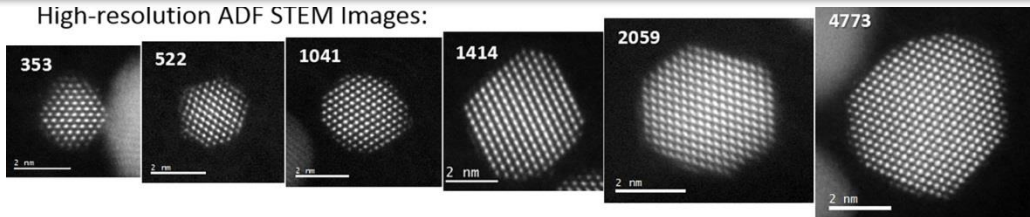
@ National Institute of Chemistry, Ljubljana, Slovenia



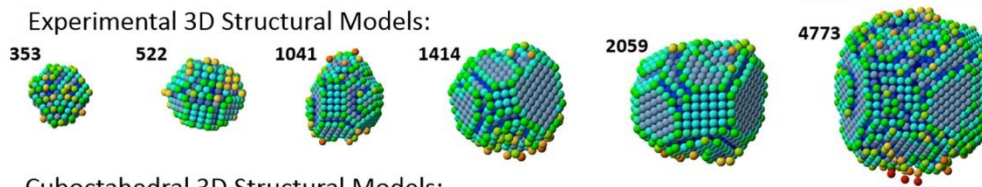
**What happens to the
nanoparticle on the
atomic level?**

The reality of nanoparticles

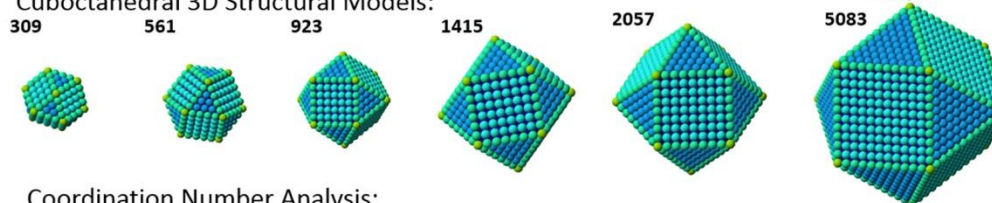
High-resolution ADF STEM Images:



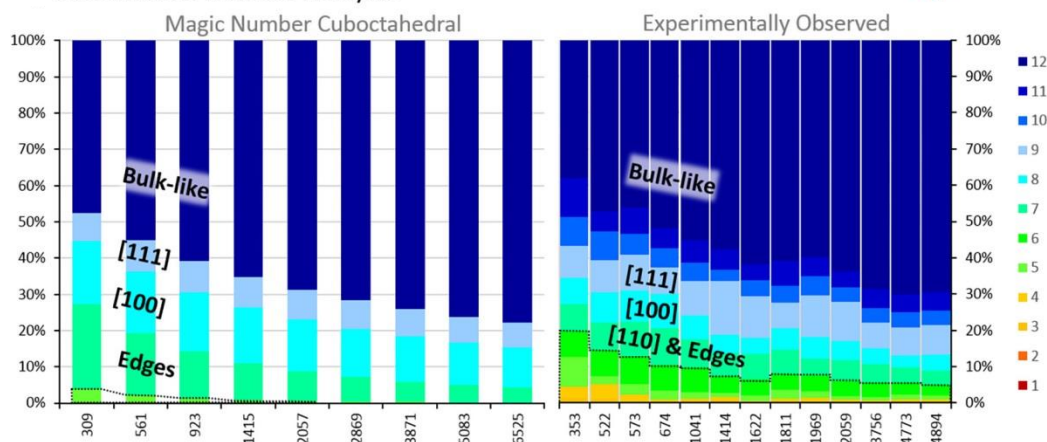
Experimental 3D Structural Models:



Cuboctahedral 3D Structural Models:



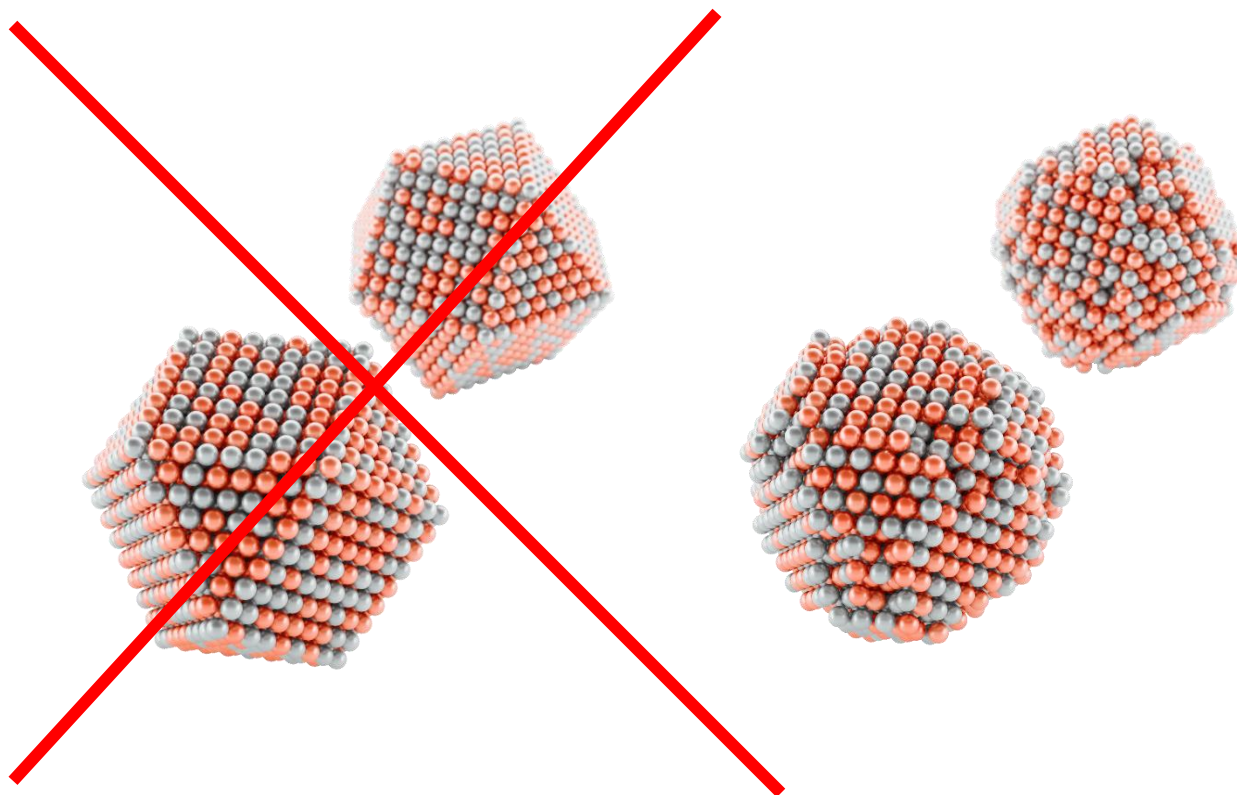
Coordination Number Analysis:



No two Pt nanoparticles are alike!

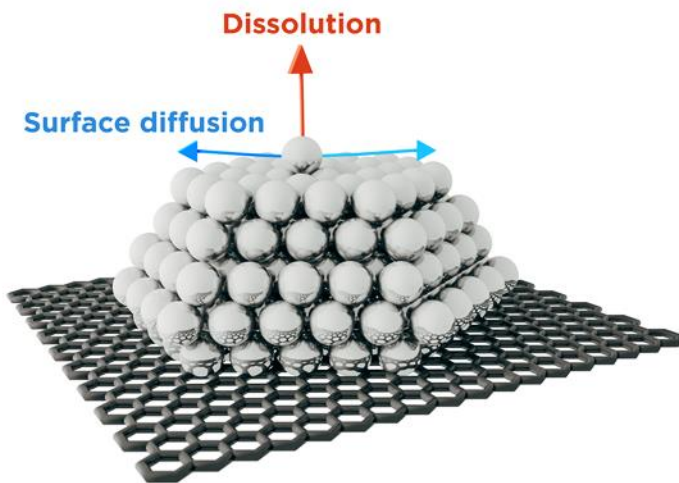
Jones*, Nellist, et al, *Nano Lett.*, 2017, 17, 4003

No ideal shapes!



The reality of nanoparticles

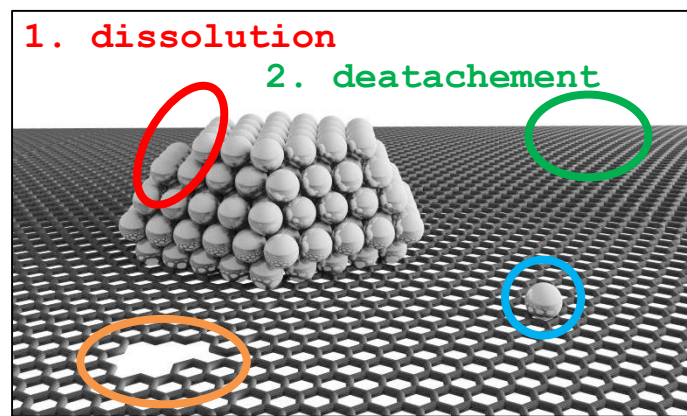
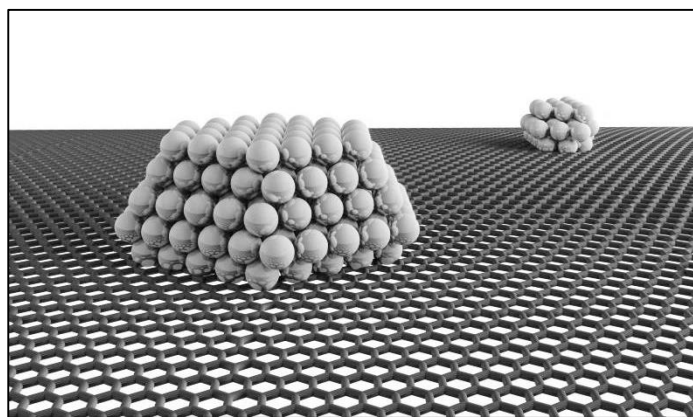
Structure-activity relationship on atomic level is a **state-of-the-art** in electrocatalysis



Structure-stability relationship at the atomic level is much less explored

Spot the difference at the atomic level

Find the four differences in the two electrocatalysts images before and after aging - and then mark in the second one.



3. carbon corrosion

4. redeposition

Hodnik* and Cherevko*, *Curr. Opin. Electrochem.*, 2019, 15, 73

Because the history of the location's physical characteristics is known, reliable conclusions on very complex atomic scale events such as degradation mechanisms can be drawn.

Impact

- Introduce new methodological approach for the fields of (electro)catalysis, corrosion, sensors, batteries, etc.
- Establish Pt- and Ir-based nanoparticles structure-stability relationships
- Develop new Pt- and Ir-based electrocatalysts with prolonged performances

Thank you for your attention!

My TEAM

4 postdocs (2x2 + 2x3 years):

1. synthesis
2. TEM
3. Online analytics (ICP-MS & OLEMS)
4. computer simulation

3 PhD-students (2x4 + 1x3.5 years) :

1. Pt-based system
2. Ir-based system
3. el. liquid TEM

4 part-time experts (no cost):

1. synthesis
2. *in-situ* TEM
3. synchrotron
4. computer simulation

+technician

Thank you for your attention!



My real motive was: a small ERC flag and an ERC cake given to us by the director ... 😊

When you get the ERC do not think you are better than other researchers who also got to the interview... there is also a considerable factor of LUCK!