# David Beke


## PERSONAL INFROMATION

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Date of birth: February, 09. 1986.


## EDUCATION

**2012-2016** (graduation: summa cum laude, 29. June, 2017)
**Ph.D course**
**Gorge Olah Doctoral School (Chemistry), Faculty of Chemical Engineering and Bioengineering, Budapest University of Technology and Economics, Budapest, Hungary**

2013 NanoValid Training and Workshop
University of Zaragoza, Zaragoza, Spain (16-21. September, 2013)

2012 XIX International Summer School Fluorescent Nanoparticles in Biomedicine
Instituto Universitario de Ciencia de Materiales, Madrid, Spain (15-20. July, 2012)

**2004-2010** **MSc in Chemical Engineering**
**Faculty of Chemical Engineering and Bioengineering, Budapest University of Technology and Economics, Budapest, Hungary**

## WORK EXPERIENCE

2022. – present Postdoctoral Research Associate
**Stavropoulos Center for Complex Quantum Matter, Department of Physics and Astronomy, University of Notre Dame**

2019. – 2022. Research Fellow
**Department of Atomic Physics, Budapest University of Technology and Economics**

2011. – present Assistant Research Fellow/Research Fellow (2011-2017/2017-present)
**Institute of Solid State Physics and Optics, Wigner Research Centre for Physics, Budapest, Hungary**

2013 – 2015. Visiting Assistant lecturer
**University of Pécs, Pécs, Hungary**

2008 – 2010. Intern
**Institute of Technical Physics and Materials Science, Centre for Energy Research, Budapest, Hungary**

2006 – 2008. Intern
**Budapest University of Technology and Economics, Faculty of Natural Sciences, Budapest, Hungary**

## SCIENTIFIC ACHIEVEMENTS

### Publications

IF: 143.41, ih: 11, i10: 12, Citations: 465

Total number of publications: 24 **International articles: 20** (D1:11, Q1:6)
First author: 13, Corresponding author 12
Conference papers: 4 In national journals: 1

Propagative articles: 1 (David Beke: Kvantumpöttyök – biológiai képalkotás, Természet Világa, **145(9)**, 396 (2014)

3 most important publications:

1. Beke et al. **THE JOURNAL OF PHYSICAL CHEMISTRY LETTERS 11,** 1675., *(2020) Room-Temperature Defect Qubits in Ultrasmall Nanocrystals*
2. Beke et al. **SCIENTIFIC REPORTS 7**, 10599, (2017) *Harnessing no-photon exciton generation chemistry to engineer semiconductor nanostructures*.
3. Beke et al. **NANOSCALE 7**, 10982, (2015), *Dominant luminescence is not due to quantum confinement in molecular-sized silicon carbide nanocrystals*

### Conferences

Oral: 6 national **23 international (5 invited),** Posters 2 national **12 international**

### Fellowships

- **János Bolyai Research Fellowship from the MTA (2019-2022)**
- UNKP New National Excellence program (2019-2020, 2020-2021, 2021-2022)
- NTP-NFTŐ-18,16, NTP-EFÖ-P15 National Talent Programs (3 times)
- Research Student Bursary – E-MRS2014
- TÁMOP 4.2.4. A/2-11-1-2012-0001 „National Excellence Program 2013-2014.
- National Traveling grants: MTA 2017/I, 2018/I Wigner: 2018/I 2016/I, 2014/I,II, 2013/I (MTA is the Hungarian Academy of Sciences)

### Awards

- György Ferenc memorial award for semiconductor research (2020)
- **Hungarian Academy of Sciences Early Career Researcher Award (2019)**
- BMe Research Grant (2017) (Budapest University of Technology and Economics)
- Graduate Student Award (GSA) E-MRS Lille 2016
- Best Presentation CMSE 2018 (Xi'an, China)
- Best Presentation Oláh György PhD. Conference (2015)
- Best Poster Award: ACIN2013 (Namur, Belgium)
- Best presentation and publication Spring Wind Ph.D Conference (2013)

## LECTURES AND TEACHING

2019 – 2023.
- **Department of Atomic Physics, Budapest University of Technology and Economics**
  Pre-engineering (English class), Physics Laboratory, physical chemistry lab.

2013 – present
- **Wigner Research Centre for Physics, Budapest, Hungary:** Undergraduate Students in Research (**supervisor**) 15 students total
- **Budapest University of Technology and Economics**

2014 – 2015.
- **University of Pécs, Hungary:** Silicon Carbide and Time Resolved Fluorescence Spectroscopy (4 lectures,)

2013
- **NanoValid Training and Workshop, Zaragoza, Spain:** *Luminescence Silicon Carbide Quantum Dots*

2012 – 2015.
- **Budapest University of Technology and Economics** Inorganic chemistry lab, polymer technology lab

2012
- **Instituto Universitario de Ciencia de Materiales, Madrid, Spain**: XIX International Summer School Fluorescent Nanoparticles in Biomedicine
  *Fluorescent Silicon Carbide Quantum Dots for Bioimaging And Sensing*

## PROJECTS/GRANTS

OTKA = Hungarian Scientific Research Fund; MTA = Hungarian Academy of Sciences; NKFIH (and NVKP) = National Research Development and Innovation Office

**2023 - 2026** • **HORIZON-EIC-2022-PATHFINDEROPEN-01-01** PERSEUS

**2021 - 2022** • **Quantum Information National Laboratory:** *Quantum Optical System development for inspection of bulk quantum materials, Synthesis of Quantum Nano-Objects* (179,000 USD/Y)

**2019- 2022** • **New National Excellence Program:** Synthesis and Characterization of optical defects in Silicon Carbide Nanoparticles (2,000 USD/Y)

As Participant

2011 – present • **MTA establishment fund (Momentum program):** *Design and characterization of semiconductor nanostructures for biomarker, solar cell and magnetometer applications*

2012 – 2016. • **OTKA No. K101819:** *Design, fabrication and analysis of luminescent silicon carbide nanocrystals for in vivo biomarker applications*

2012 – 2016. • **OTKA No. K106114:** *Development of novel silicon carbide nanomarkers and more effective glutamate and GABA uncaging materials for measurement of neuronal network activity and dendritic integration with three-dimensional real-time two-photon microscopy*

2015 – 2018. • **Visegrad Group (V4) + Japan Joint Research Project** *on Advanced Materials: Nanophotonics with metal - group IV-semiconductor nanocomposites: From single nanoobjects to functional ensembles (NaMSeN)*

2016 – 2019. • **NVKP_16-1-2016-0043:** *Development of fluorescent dyes and microscope for the treatment of epilepsy*

2017 – 2021. • **NKFIH Grant No. 2017-1.2.1-NKP-2017-00001:** *National Quantumtechnology Program: Creation and distribution of quantum bits and development of quantum information networks*

2018 – 2021. • **EU QuantERA project:** *Scalable Electrically Read Diamond Spin Qubit Technology for Single Molecule Imagers*

2018 – 2021. • **EU QuantERA project:** *Spin-based nanolytics - Turning today's quantum technology research frontier into tomorrow's diagnostic devices*

2019 – 2023. • **National Excellence Program:** *Quantum-coherent materials*

## PUPLICATION LIST (international)

1. Kollarics S, et al. **Carbon 188** 393 (2021), *Ultrahigh nitrogen-vacancy center concentration in diamond* doi
2. Beke et al. **Chemistry of Materials 33,** 2457., (2021) *Enhancement of X-Ray Excited Red Luminescence of Chromium Doped Zinc Gallate via Ultrasmall Silicon Carbide Nanocrystals*.
3. Belinova T, Machova I, Fucikova A, Gali A, Beke D, Humlova Z, Valenta J, Kalbacova MH, **NANOMATERIALS 10,** 573. (2020), *Immunomodulatory Potential of Differently-Terminated Ultra-Small Silicon Carbide Nanoparticles* doi
4. Károlyházy G, Beke D, Zalka D, Lenk S. Krafcsik O. Kamarás K. Gali Á, **NANOMATERIALS 10,** 538., (2020), *Novel method for electroless etching of 6H–SiC* doi
5. Mazurak A, Mroczyński R, Beke D, Gali A, **NANOMATERIALS 10,** 2387., (2020), *Silicon-Carbide (SiC) Nanocrystal Technology and Characterization and Its Applications in Memory Structures* doi
6. Beke D, Valenta J, Károlyházy, Gy, Lenk S, Czigány Zs, Márkus G B, Kamárs K, Simon F, Gali A, **THE JOURNAL OF PHYSICAL CHEMISTRY LETTERS 11,** 1675., *(2020) Room-Temperature Defect Qubits in Ultrasmall Nanocrystals* doi
7. Beke D, Fučíková A, Jánosi TZ, Károlyházy, Gy, Somogyi B, Lenk S, H. Krafcsik O, Czigány Zs, Erostyák J, Kamarás K, Valent J, Gali Á, **JOURNAL OF PHYSICAL CHEMISTRY C 122,** 26713., (2018) *Direct Observation of Transition from Solid-State to Molecular-Like Optical Properties in Ultrasmall Silicon Carbide Nanoparticles* doi
8. Dravecz G, Jánosi TZ, Beke D, Károlyházy Gy, Erostyák J, Kamarás K, Gali A, **PHYSICAL CHEMISTRY CHEMICAL PHYSICS 20,** 13419., (2018) *Identification of the binding site between Bovine Serum Albumin and ultrasmall SiC fluorescent biomarkers* doi
9. Beke D, Karolyhazy G, Czigany Z, Bortel G, Kamaras K, Gali A, **SCIENTIFIC REPORTS 7,** 10599., (2017) *Harnessing no-photon exciton generation chemistry to engineer semiconductor nanostructures* doi
10. Beke D, Horváth K, Kamarás K., Gali A, **Langmuir 33**, 14263., (2017) *Surface-Mediated Energy Transfer and Subsequent Photocatalytic Behavior in Silicon Carbide Colloid Solutions* doi
11. Beke D , Jánosi TZ, Somogyi B , Major DÁ, Szekrényes Zs , Erostyák J , Kamarás K , Gali A., **JOURNAL OF PHYSICAL CHEMISTRY C 120,** 685., (2016) *Identification of Luminescence Centers in Molecular-Sized Silicon Carbide Nanocrystals* doi
12. Dravecz G, Bencs L, Beke D, Gali A, **Talanta 147**, 271., (2016) *Determination of silicon and aluminum in silicon carbide nanocrystals by high-resolution continuum source graphite furnace atomic absorption spectrometry* doi
13. Beke D, Szekrenyes Zs, Czigany Zs, Kamaras K, Gali A., **NANOSCALE 7,** 10982., (2015) *Dominant luminescence is not due to quantum confinement in molecular-sized silicon carbide nanocrystals* doi
14. Castelletto S, Johnson B, Zachreson C, Beke D, Balogh I, Ohshima T, Aharonovich I, Gali A., **ACS NANO 8,** 7938, (2014) *Room Temperature Quantum Emission from Cubic Silicon Carbide Nanoparticles* doi
15. Szekrényes Zs, Somogyi B, Beke D, Károlyházy Gy, Balogh I, Kamarás K, Gali A, **JOURNAL OF PHYSICAL CHEMISTRY C 118,** 19995., (2014) *Chemical Transformation of Carboxyl Groups on the Surface of Silicon Carbide Quantum Dots* doi
16. Beke D, Szekrényes Zs, Pálfi D, Róna G, Balogh I, Maák, P, Katona G, Czigány Zs, Kamarás K, Rózsa JB, Buday L, Vértessy B, Gali A, **JOURNAL OF MATERIALS RESEARCH28 2,** 205, (2013) *Silicon carbide quantum dots for bioimaging* doi
17. Beke D, Szekrényes Zs, Balogh I, Czigány Zs, Kamarás K, Gali A., **JOURNAL OF MATERIALS RESEARCH28 1.** 44., (2013) *Preparation of small silicon carbide quantum dots by wet chemical etching* doi
18. Beke D, Szekrényes Zs, Balogh I, Veres M, Fazakas É, Varga LK, Czigány Zs, Kamarás K, Gali Á, **MRS SYMPOSIUM PROCEEDINGS 1468** 19., (2012) *Preparation of small silicon carbide quantum dots by wet chemical etching*
19. Beke D, Szekrényes Zs, Balogh I, Veres M, Fazaka É, Varga LK, Kamarás K, Gali A, **APPLIED PHYSICS LETTERS 99**, 213108., (2011) *Characterization of luminescent silicon carbide nanocrystals prepared by reactive bonding and subsequent wet chemical etching* doi
20. Beke D, Pongrácz, A, Battistig G, Josepovits K, Pécz, B, **AIP CONFERENCE PROCEEDINGS 292,** 23., (2010) *Selective Growth of Nanocrystalline 3C-SiC Thin Films on Si* doi