



## Prof. Dr. Prof. h.c. Dr. h.c. Stan Veprek:

### Short Summary

Stan Veprek was born on May 27, 1939 in Písek, Czech Republic. He is citizen of Switzerland and Czech Republic, and married to Dr. Maritza G. J. Veprek-Heijman (citizen of The Netherlands and Switzerland). Stan has 4 children: Miroslav (33 y), Ratko Goran (30 y), Nynke Anna (18 y) and Libuse Hannah (17 y).

After his initial research work in plasma diagnostics and spectroscopy, Stan Veprek began his work on the deposition of thin films by means of plasma CVD in 1962 ago at the Institute of Physics of the Czech Academy of Science, where he started his scientific career after an education as a high school teacher (in Ceske Budejovice), followed by the study of physics at the Charles University in Prague (graduated 1962). His first major result was the deposition of nanocrystalline silicon, nc-Si, by means of chemical transport in plasma (published in 1968; nowadays, nc-Si is an important material for large-scale microelectronics, flat panel displays and thin films solar cells). In 1968 he followed an invitation of Prof. H.Schäfer to the University Münster (Germany), where he continued his work in plasma chemistry and published various papers on the effects of low pressure glow discharge plasmas on the chemistry of heterogeneous systems. In 1971 he moved to the University of Zürich, Switzerland, where he received his PhD in Chemistry (1972) and habilitation in inorganic chemistry (1977). He became involved in the research of the plasma-wall interactions in the TOKAMAK devices for controlled nuclear fusion. In 1976 he proposed the protective coating of the inner wall with boron carbide, and in the following years developed the "boronization" by means of plasma CVD, which found successful application in many large fusion devices (TOKAMAKS and Stellarators) around the world. His continuing interest in nc-Si resulted in, among others, the classical papers on Raman scattering and phonon confinement, later on extended to in-depth studies of the photoluminescence from nc-Si. Together with the Swiss national museum he developed a new plasma-chemical method for the restoration and conservation of archeological metallic artifacts.

In 1988 he was appointed full Professor and head of the Institute for Chemistry of Inorganic Materials at the Technical University of Munich, where he continued his research on a- and nc-Si, organometallic CVD, heteroepitaxy of  $3C$ -SiC and others.

Here, also the design principle for superhard materials was born in 1995. In this field, he continued his collaboration with Prof. Li Shizhi (Qingdao University of Science and Technology, China) and begun a collaboration with a Czech company SHM, which pioneered the industrialization of superhard nanocomposites coatings based on his design concept. His latest work focuses on the understanding of the formation of the superhard nanocomposites by spinodal phase segregation and of their mechanical properties by means of combined *ab initio DFT and thermodynamics studies, and by non-linear FEM* (collaboration with Dr. R. F. Zhang (visiting scientist at TUM), Prof. A.S. Argon and D. M.Parks (Massachusetts Inst. of Technol., his wife and other colleagues).

After his formal retirement from teaching at the TUM in 2004 (according to the law Professor in Germany has to retire at the age of 65), he is still active in research projects (**research projects funded by the German Research Foundation and several EU projects with international industrial consortia; funding on average more than 130 000 EUR/year**). He is also teaching courses at the TUM and at the National University of Singapore. Only **since January 2005 he was invited to give 58 Invited, Plenary and Keynote Lectures** at international conferences and seminar lectures at Universities and research institutes (see attachment).

Stan has **published 374 papers (see attachment for the last 5 years) and several bookchapters**.

The most recent book co-authored with Prof. C. Koch, I. Ovidko and S. Seal "Structural Nanocrystalline Materials" (Cambridge University Press 2007). He is co-editor of Plasma Chemistry and Plasma Processing, and has co-organized various conferences and sessions at ISPC, MRS, ICMCTF and others, and served on several IUPAC and Int. Union of Vacuum Societies committees.

He has been **teaching Professor and visiting scientist at several Universities and Research Institutions** in China, Czech Republic, USA, Great Britain, Singapore and Japan.

**Awards: Stan Veprek received the Silver Medal of the Societe d'Encouragement Pour la Recherche et l'Invention, Paris (1979), Silver Medal of the Masaryk University Brno (1991), Honorary Doctorate (Dr. h.c.) from the Masaryk University Brno, Czech Republic (1999), the Blaise Pascal Medal of the European Academy of Sciences (2004) and the AVS John Thornton Memorial Award of the American Vacuum Society (2005).** In 2003 he was appointed foreign member of the Commission I of Low-Temperature Plasma Chemistry, Polish Academy of Sciences, Branch Lublin. In July 2009 he has been elected the Fellow of the International Plasma Chemistry Society, and in October 2010 he has been awarded Honorary Professor of the Qingdao University of Science and Technology.

INVITED LECTURES AT INTERNATIONAL CONFERENCES  
S I N C E J A N U A R Y 2 0 0 5

**Prof. Dr. S. Veprek: Invited Lectures at Int. Conferences since January 2005**

1. **Invited lecture** at the 3<sup>rd</sup> Annual Symposium Nano-Materials for Defense Applications, Kona, Hawaii February 2005: "**Superhard nanocomposites with High Thermal Stability and Oxidation Resistance :Preparation, Properties, and Present and Future Applications**".
2. **Invited lecture** at the International Conference on Metallurgical Coatings and Thin Films, CMCTF 2005, San Diego, May 2005: "**Superhard Nanocomposites: Past, Present and Future**".
3. **Invited lecture** at the International Conference on Nanomaterials and Nanotechnologies (NN 2005), Crete, Greece; June 14 - 18, 2005: "**Recent Progress in Superhard Nanocomposites**".
4. **Invited lecture** at the International Conference on Surfaces, Coatings and Nanostructured Materials, University of Aveiro, Portugal, 7-9 September 2005: "**Basic Science of Superhard Nanocomposites and Recent Development of their Industrial Applications**".
5. **Invited one-day Course:** University of Aveiro, Portugal, 6<sup>th</sup> September 2005. "**Nano-Sized and Nano-Structured Materials: Process Technology, Characterization, Properties and Industrial Applications**".
6. **Invited Lecture** at the Int. Conf. on "Novel Applications of Surface Modification" organized by the Applied Physics and Technology Division of the Institute of Physics, Chester, England, September 18-21: "**Superhard Nanocomposites with High Thermal Stability: Conditions needed for their reproducible preparation, their properties and industrial applications**".
7. **Invited lecture** at the Int. EU- workshop Nanohard 2005, Plovdiv, Bulgaria October 19-21: "**Different approaches to superhard coatings and nanocomposites**".
8. In November 2005 the American Vacuum Society awarded the **John A Thornton Award and lecture to Prof Stan Veprek**, Technical University Munich, "**for the generic design concept of strong and hard materials as well as their deposition as thin films by plasma assisted techniques**". The lecture was delivered at the **Int. AVS Symposium**, on Monday October 31 in the session on "**Nanocomposites and coatings with enhanced thermal stability**".
9. **Invited lecture** at the ESF symposium Novel Superhard Materials, Bayreuth (Germany) 16-20 November 2005: "**The Origin of Superhardness in TiN/Si<sub>3</sub>N<sub>4</sub> Nanocomposites: The Role of the Interfacial Monolayer**".
10. **Invited lecture** at the Fall Meeting of the Mater. Res. Soc., Boston Nov.-Dec. 2005, Symposium Y2: Mechanical and Functional Properties of Thin Films: "**Superhard Nanocomposites: Their Development, Properties, Present and Future**".

11. **Invited lecture** at the Int. Conf. on Superhard Coatings, Ein Gedi (Israel), February 27 – March 1, 2006: "**The Formation and Role of Interfaces in Superhard nc-Me<sub>n</sub>N/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposites**", co-author M.G.J. Veprék-Heijman.
12. **Invited lecture** at the Int. Conf. on Superhard Coatings, Ein Gedi (Israel), February 27 – March 1, 2006: "**Industrial Production and Application of Nanocomposite Coatings**".
13. **Plenary lecture** at the Singapore Int. Symposium 2006, organized by A\*STAR, EDB (Singapore) and Mitsui Chemicals (Japan), Singapore, April 16 – 18, 2006: "**Superhard and Functional Nanostructured Thin Films: From Generic Design Principle to Industrial Applications**".
14. **Plenary lecture** at the Int. Conf. Metallurgical Coatings and Thin Films, San Diego (USA), May 1 – 5, 2006: "**Nano-Sized and Nano-Structured Inorganic Materials and Thin Films, Why and When**".
15. **Invited Keynote Lecture** at the Int. Conf. NANO HARD 2006, Sozopol (Bulgaria), May 27-31: "**Superhard Nanocomposite Coatings: Their deposition, Properties and Industrial Applications**".
16. **Invited lecture** at the 33<sup>rd</sup> European Physical Society Conference on Plasma Physics, Roma (Italy), June 19 – 23, 2006: "**Nano-Sized and Nano-Structured Thin Films Deposited by Low Pressure Plasma CVD and PVD**".
17. **Invited lecture** at the 7<sup>th</sup> Int. Conf. on Solid State Chemistry 2006, Pardubice (Czech Republic), September 24 – 29, 2006: "**The Chemistry, Physics and Fracture Mechanics in the Search for Superhard Materials: The origin of Superhardness on nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposites**".
18. **Invited lecture** on the International Workshop on Industrial Applications of Superhard and Functional Coatings, Prague, October 25 – 28, 2006: "**Understanding of the Origin of Superhardness in the nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and related Nanocomposites: Implications for Industrial Production**".
19. **Plenary lecture** on the 5<sup>th</sup> Asian – Australian Conference on Composite Materials (ACCM-5), Hong Kong, November 27 – 30, 2006: "**The Origin of Superhardness in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposites, their Properties and Industrial Applications**".
20. **Plenary lecture** on the int. conference Synthesis and Methodologies in Inorganic Chemistry 2006, Bressanone (Italy), December 3 – 7, 2006: "**Nano-Sized and Nano-Structured Materials and Thin Films**".
21. **Invited lecture** at the International Meeting on Developments in Materials, Processes and Applications of Nanomaterials 2007, Belfast, January 13 – 15, 2007: "**Origin of Superhardness in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and Related Nanocomposites**".
22. **Invited lecture** at the Int. Workshop on Chloride-Based Epitaxial Growth of SiC, Linköping (Sweden), February 19 – 20, 2007: "**Heteroepitaxy of 3C-SiC on Si using Methyltrichlorosilane**".

23. **Plenary lecture** at the WOM-16<sup>th</sup> Int. Conf. on Wear of Materials, April 15-19, 2007, Montreal, Quebec, Canada: **"Superhard Nanocomposites for Wear Protection in Fast and Dry Turning, Drilling, Milling and other Machining Operations"**.
24. **Keynote Lecture** at Int. Conference on the Development, characterization and industrial application of nanostructured thin films, hard and superhard coatings, "NANO HARD", Velingrad, Bulgaria, May 13. – 16, 2007: **"The Origin of Superhardness in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and nc-TiN/a-Si<sub>3</sub>N<sub>4</sub>/TiSi<sub>2</sub> Nanocomposites Studied by means of *ab initio* DFT Calculations in Combination with Tabor Criterion, Sachs's Average and Hertzian Theory"**.
25. **Plenary lecture** at the Int. Conf. on Surfaces, Coatings and Nanostructured Materials, Algarve (Portugal), July 9 – 11, 2007: **"Nano-Sized and Nano-Structured Inorganic Materials and Thin Films"**.
26. **Invited lecture** at the University of Darmstadt (Germany) within the series: Nanomaterialien in Natur- und Ingenieurwissenschaften, June 14, 2007, **"Nanocrystalline and -structured Materials: Why and when"**.
27. **Invited distinguished lecture** 15<sup>th</sup> Int. Conf. on Composites and Engineering, Haikou, Hainan Island (China), July 15-21, 2007: **"Super- and Ultrahard Nanocomposites: Origin of the Hardness Enhancement and their Industrial Applications"**.
28. **Keynote Lecture** at the International Conference on Nanotechnology and Advanced Materials 2007 (ICNAM 2007), Hong Kong, December 11 – 14, 2007: **"Superhard Nanocomposites: Recent Progress in the Understanding of their Preparation and Properties and Large-Scale Industrial Applications in Dry and Fast Machining"**.
29. **Invited lecture** at the 9<sup>th</sup> Int. Conf. on the Science of Hard Materials, Montego Bay, Jamaica, March 9 – 15, 2008: **"The origin of Hardness Enhancement in Superhard Nanocomposites and Heterostructures, their Properties and Industrial Applications"**.
30. **Keynote Lecture** at the International Conference on Functional Nanocoatings, Budapest, 30<sup>th</sup> March – 2<sup>nd</sup> April, 2008: **"Recent Progress in the Understanding of the Formation, Hardness Enhancement and Properties of Superhard Nanocomposites in Comparison with Heterostructures"**.
31. **Invited lecture** at 1st International Conference *from Nanoparticles and Nanomaterials to Nanodevices and Nanosystems*, Chalkidiki, Greece, June 16-18, 2008 **"Superhard Nanocomposites and Heterostructures: Origin of the Hardness Enhancement, their Properties and Industrial Applications"**.
32. **Invited lecture** at the 4<sup>th</sup> International Conference on Technological Advances of Thin Films & Surface Coatings, Singapore, July 13 – 16, 2008: **"Origin of Ultrahardness of > 100 GPa in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub>/TiSi<sub>2</sub>, nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and related nanocomposites, and their Non-Linear Mechanical Properties"**.

33. **Keynote Lecture** at the 16<sup>th</sup> Int. Conference on Composite/Nano-Engineering, Kunming (China) July 20 – 25, 2008: **"Super- and Ultrahard Nanocomposite Coatings: Past, Present and Future"**.
34. **Plenary Lecture** at the 3<sup>rd</sup> International Conference on Surfaces, Coatings and Nanostructured Materials, NanoSMat 3, Barcelona, 21<sup>st</sup> – 24<sup>th</sup> October 2008: **"Strategies to Synthesize Super- and Ultrahard Materials"**.
35. Teaching an **Invited Course** during NanoSMat 3, Barcelona 20<sup>th</sup> October 2008: **"Structural, Functional and Superhard Nano-Structured Materials: Scientific Fundamentals and Industrial Applications"**.
36. **Invited Lecture** at the Int. Workshop on Advanced Nanostructured Materials and Thin Films for Industrial Applications, The University of Nottingham, U. K., November 10 – 13, 2008: **"Industrial Applications of Superhard Nanocomposites"**. S. Veprek (presenting author) and Maritza G. J. Veprek-Heijman.
37. **Invited colloquium** lecture at the Technical University Freiberg: **The ways towards the design of Superhard Nanocomposites: Preparation, Properties and Industrial Applications.** /th – 9<sup>th</sup> December 2008.
38. **Invited Lecture** at the Int. Conf. on Nanostructured Materials and Nanocomposites (ICNM – 2009), Kottayam (India), April 5 – 8, 2009: **"Different Theoretical and Experimental Approaches towards the Design of Superhard Materials"**.
39. **Plenary Lecture** at the Int. Workshop. on Nano-Structured Materials, Thin Films and Hard Coatings for Advanced Applications, NANO HARD 2009, Sozopol (Bulgaria) May 23 – 27, 2009: **"Recent Progress in the Understanding, Preparation and Properties of Super- and Ultra-hard Nano-Structured Coatings"** and
40. **Invited lecture** at "NANO HARD": on the **"Industrial Applications of Hard and Superhard Nanocomposites"**.
41. **Invited Lecture** at the European Mater. Research Soc. Spring Meeting, Symposium P: Protective Coatings and Thin Films'09, Strasbourg, June 8-12, 2009: **"Recent Progress in the Understanding of the Origin of Hardness Enhancement in Superhard Nanocomposites and of their Preparation"**.
42. **Invited Lecture** on the Int. Meeting on Plasmas Surfaces and Thin Films, Institute of Physics, London, June 16, 2009: **"Different approaches to the design of superhard (> 40 GPa) and ultrahard (>80 GPa) materials"**.
43. **Invited Lecture** at the 2<sup>nd</sup> International Conference *from Nanoparticles and Nanomaterials to Nanodevices and Nanosystems*, Island of Rhodes, Greece, June 28- July 3, 2009: **"Search for New Ultrahard Materials: Go Nano!"**.
44. **Invited** to teach a **course "Nanostructured Materials"** 4 days in Kuala Lumpur (Malaysia), September 21-24, 2009.
45. **Invited colloquium** lecture at the Institute of Physics, Chinese Academy of Sciences, Hefei, October 5 – 8, 2009: **Intrinsic and Extrinsic Superhard Materials.**

46. **Keynote Lecture** at the 2<sup>nd</sup> **Int. Conf. on Multifunctional Materials and Structures**, Qingdao (China) October 9 – 12, 2009: **"Superhard Nanocomposites: their Design, Properties and Industrial Applications"**.
47. **Invited colloquium** lecture at the occasion of awarding Prof. Veprek with the **Honoraray Professorship of the Qingdao University of Science and Technology: The Search for Supeer- and Ultrahard Materials**.
48. **Invited lecture** on the Int. Workshop Synthesis and Characterization of Advanced Nanostructured Materials and Coatings, Moscow, October 20-22: **"The Attempts to Design Ultrahard Materials"**.
49. **Invited colloquium** lecture at the Technical University Vienna, 16<sup>th</sup> November 2009: **The Search for Ultrahard Materials: Go Nano!**
50. **Keynote Lecture** at the 14<sup>th</sup> **Israel Materials Engineering Conference (IMEC – 14)**, Tel Aviv, Israel, December 13-15: **"Design principle for Superhard Nanocomposite Coatings, their Properties and Industrial Applications"**.
51. Technion Haifa, **Invited** Schulich Faculty Colloquium, 17<sup>th</sup> December 2009: **Nanosized and –structured Inorganic Materials: Why and When**.

#### **Invitations 2010:**

52. University of Ancona, Italy, February 12, 2010, **Workshop** on Industrial Applications of Superhard Nanocomposite Coatings for SMEs: **Industrial Applications of Hard and Superhard Nanocomposite Coatings on Tools for Machining**.
53. Hungarian Academy of Sciences, Budapest, March 2, 2010, **Workshop** on Industrial Applications of Superhard Nanocomposite Coatings for SMEs: **Industrial Applications of Hard and Superhard Nanocomposite Coatings on Tools for Machining**.
54. **Plenary Lecture** at the European Conference on Nanofilms, Liege, Belgium, March 22-25, 2010: **Nanostructured Hard, Superhard and Functional Thin Films: Past, Present and the Future**.
55. **Invited Lecture** at the 12<sup>th</sup> **Int. Ceramic Congress & 5<sup>th</sup> Forum on New Materials**, Montecatini Terme, Italy, June 6 – 18, 2010: **"Design of Super- (H>40 GPa) and Ultrahard (H>80 GPa) Nanocomposite Coatings: Theoretical background, experiments, and industrial applications"**.
56. **Invited Lecture** at the 6<sup>th</sup> **Int. Conf. on Materials Structure, & Micropomechanics of Fracture**, Brno (CZ), June 27 – 30, 2010.
57. **Plenary Lecture** at the 6<sup>th</sup> **Int. Conf. on Diffusion in Solids and Liquids**, Paris, July 4 – 7, 2010: **Search for New Ultrahard Materials: Go Nano!**

**58. Plenary Lecture** at the 5<sup>th</sup> Int. Conf. on the Technological Advances of Thin Films & Surface Coatings, Harbin (China) July 11<sup>th</sup> – 14<sup>th</sup>, 2010: **Search for New Ultrahard Materials: Go Nano!**

**59. NANOSMAT** – Lecture and Course

PUBLICATION

S I N C E   J A N U A R Y   2 0 0 5

327. S.Z. Li, Q.F. Fang, Q. Liu, J. Gao, P. Nesladek, J. Prochazka, M.G.J. Veprek-Heijman and S. Veprek:  
Thermally Activated Relaxation Processes in Superhard Nanocomposites Studied by means of Internal Friction Measurements.  
*Composite Sci. Technol.* **65** (2005) 735-740.
328. Stan Veprek, Maritza G.J. Veprek-Heijman, Pavla Karvankova and Jan Prochazka:  
Different Approaches to Superhard Coatings and Nanocomposites.  
Invited Review, *Thin Solid Films* **476** (2005) 1-29.
329. Stan Veprek and Maritza G.J. Veprek-Heijman:  
Concept for the Design of Superhard Nanocomposites with High Thermal Stability: Their Preparation, Properties and Industrial Applications  
Invited Review Chapter in: A. Cavaleiro and J. Th. M. De Hosson, Eds.,  
*Nanostructured Coatings*, Springer-Verlag, New York (2005), p.345-406.
330. Stan Veprek:  
Reproducibility of the Deposition and Industrial Applications of Stable, Superhard Nanocomposites.  
Keynote Lecture, The 4th International Conf. On Surface Engineering, Shenzhen, China, October 29 - 31, 2004. *Transactions of Nonferrous Metals Society of China (Engl. Ed.)* **14**, Suppl. 2, (2004) 19-24.
331. M. H. Manghnani, S. N. Tkachev, P. V. Zinin, Ch. Glorieux, P. Karvankova and S. Veprek:  
Elastic Properties of nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposite Films by Surface Brillouin Scattering.  
*J. Appl. Phys.* **97** (2005) 054308.
332. S. Veprek, P. Karvankova and M. J. G. Veprek-Heijman:  
Possible Role of Oxygen Impurities in Degradation of nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposites.  
*J. Vac. Sci. Technol. B* **23** (2005) L17.
333. D. Ma, S. Ma, K. Xu and S. Veprek:  
Effect of Oxygen and Chlorine on Nano-Structured TiN/Si<sub>3</sub>N<sub>4</sub> Films Hardness.  
*Materials Lett.* **59** (2005) 838-841.
334. P. Karvankova, M. G. J. Veprek-Heijman, D. Azinovic and S. Veprek:  
Properties of Superhard nc-TiN/a-BN and nc-TiN/a-BN/a-TiB<sub>2</sub> Nanocomposite Coatings Prepared by Plasma Induced Chemical Vapor Deposition.  
*Surf. Coat. Technol.* **200** (2006) 2978.
335. S. Veprek, H.-D. Männling, P. Karvankova and J. Prochazka:  
The Issue of Reproducibility of Deposition of Superhard Nanocomposites with Hardness of > 50 GPa.  
*Surf. Coat. Technol.* **200** (2006) 3876-3885.
336. A. C. Fischer-Cripps, P. Karvankova and S. Veprek:  
On the Measurement of Hardness of Super-Hard Coatings.  
*Surf. Coat. Technol.* **200** (2006) 5645-555654.
337. R. F. Zhang and S. Veprek:  
On the Spinodal Nature of the Phase Segregation and Formation of Stable Nanostructure in the Ti-Si-N System.  
*Mater. Sci. Eng. A* **424** (2006) 128-137.
338. R. G. Veprek, D. M. Parks, A. S. Argon and S. Veprek:  
Non-Linear Finite Element Constitutive Modeling of Mechanical Properties of Hard and Superhard Materials Studied by Indentation.  
*Mater. Sci. Eng. A* **448** (2007) 366-378.

339. S. G. Prilliman, S. M. Clark, A. P. Alivisatos, P. Karvankova and S. Veprek:  
Strain and Deformation in Ultra-Hard Nanocomposites nc-TiN/a-BN under Hydrostatic Pressure.  
Mater. Sci. Eng. A **437** (2006) 379-387.
340. S. Veprek:  
The Origin of Superhardness in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposites: The Role of the Interfacial Layer.  
Invited Paper at ESF PESC Exploratory Workshop "Novel Superhard Materials", Bayreuth 16-20 November 2005.  
Int. J. High Pressure Research **26** (2006) 119-125.
341. C. C. Koch, I. A. Ovidko, S. Seal and S. Veprek:  
Structural Nanocrystalline Materials.  
Cambridge University Press, Cambridge 2007. (Book)
342. S. Veprek and M. G. J. Veprek-Heijman:  
The Formation and Role of Interfaces in Superhard nc-Me<sub>n</sub>N/a-Si<sub>3</sub>N<sub>4</sub> Nanocomposites.  
**Invited Paper** at the Int. Conf. on Superhard Coatings, Ein Gedi (Israel), March 2006.  
Surf. Coat. Technol. **201** (2007) 6064.
343. R. F. Zhang and S. Veprek:  
Metastable Phases and Spinodal Decomposition in Ti<sub>1-x</sub>Al<sub>x</sub>N System studied  
by *ab initio* and thermodynamic modeling, a Comparison with the TiN-Si<sub>3</sub>N<sub>4</sub> System.  
Mater. Sci. Eng. A **448** (2007) 111.
344. S. Hao, B. Delley, C. Stampfl and S. Veprek:  
Superhard nitride-based nanocomposites: Role of Interfaces and effect of impurities.  
Phys. Rev. Lett. **97** (2006) 086102.
345. A. Chojecki, M. Veprek-Heijman, T. E. Müller, P. Schäringer, S. Veprek and J. A. Lercher:  
Tailoring Raney-catalysts for the selective hydrogenation of butyronitrile to n-butylamine.  
J. of Catalysis **245** (2007) 237.
346. Stan Veprek, Maritza G. J. Veprek-Heijman and Ruifeng Zhang:  
The Chemistry, Physics and Fracture Mechanics in the Search for Superhard Materials, and the Origin of Superhardness in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and related Nanocomposites.  
**Invited Paper** at the 7<sup>th</sup> International Conference of Solid State Chemistry 2006 (SSC 2006), Pardubice, Czech Republic, September 24-29, 2006;  
J. Phys. Chem. Solids **68** (2007) 1161.
347. Q. F. Fang, Q. Liu, S. Z. Li, Z. S. Li, P. Karvankova, M. Jilek and S. Veprek:  
Internal Friction Studies of Nanocomposite Superhard nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and nc-(Ti<sub>1-x</sub>Al<sub>x</sub>)N/a-Si<sub>3</sub>N<sub>4</sub> Films.  
Mater. Sci. Eng. A **442** (2006) 328.
348. R. F. Zhang and S. Veprek:  
Phase stabilities and spinodal decomposition in Cr<sub>1-x</sub>Al<sub>x</sub>N system studied  
by *ab initio* LDA and thermodynamic modeling: Comparison with Ti<sub>1-x</sub>Al<sub>x</sub>N and TiN/Si<sub>3</sub>N<sub>4</sub> system.  
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349. Stan Veprek, Chunlin Wang and Maritza G. J. Veprek-Heijman:  
The Role of Oxygen Impurities in Anisotropic Etching of Crystalline Silicon by Atomic Hydrogen, and in the Deposition of Single-Phase Nanocrystalline Silicon.  
J. Vac. Sci. Technol. A **26**(2008) 313.
350. R. F. Zhang and S. Veprek:  
Phase stabilities of self-organized nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> nanocomposites and of Ti<sub>1-x</sub>Si<sub>x</sub>N<sub>y</sub> solid solutions studied by *ab initio* calculation and thermodynamic modeling.  
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352. R. F. Zhang, S. H. Sheng and S. Veprek:  
Mechanical Strengths of Silicon Nitrides studied by *ab initio* Calculations.  
Appl. Phys. Lett. **90** (2007) 191903.
353. R. L. Boxman, S. Vepřek, V. Zhitomirsky and A. Raveh:  
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Society of Vacuum Coaters Bulletin, Summer 2007), p. 24.
354. Stan Veprek, Ali S. Argon, R. F. Zhang and Maritza Veprek-Heijman:  
The origin of Superhardness in nc-TiN/a-Si<sub>3</sub>N<sub>4</sub> and nc-TiN/a-Si<sub>3</sub>N<sub>4</sub>/TiSi<sub>2</sub> Nanocomposites studied by means of *ab initio* DFT Calculations in Combination with Tabor Criterion, Sachs's Average and Hertzian Theory.  
**Keynote Lecture** at the Int. Conf. NANO HARD, Velingrad, Bulgaria, May 13-16, 2007.  
Published by the Bulgarian Academy of Sciences, Academic Publishing House "Marin Drinov", Sofia 2007, p. 1.
355. R. F. Zhang and S. Veprek:  
Mechanism of the B3 to B1 Transformation in Cubic AlN under Uniaxial Stress.  
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