

Education History

Degree	University	Year of Graduation
PhD	University of Tokyo, Japan	1998
BSc	Korea University, Japan	1989

Professional Experience

Date	Employer	Designation
2022-Current	QNS, IBS, Ewha Womans University, Korea	
2016-2022	CEMES-CNRS, France	Guest Scientist
2006-2016	IMRE, Singapore	Scientist
2003-2005	Free University Berlin, Germany	Research Worker
1999-2003	Free University Berlin, Germany	Guest Scientist
1998-1999	IIS, University of Tokyo, Japan	Visiting Scholar
1997-1998	IIS, University of Tokyo, Japan	Research Associate

Publications & Proceedings

List of publications in refereed international journals

1. T.Oguchi, I.Kanazawa, T.Iwashita, **W.-H.Soe**, A.Yamaguchi and R.Yamamoto, "Solid state amorphization in Cu-Hf multilayers studied by time-differential perturbed-angular correlation", J. Non-Cryst. Solids Vol.150 PP.448-451 (1992)
2. A.Yamaguchi, S.Ogu, **W.-H.Soe** and R.Yamamoto, "Theory of the strain-induced magnetic anisotropy of transition metal-noble metal multilayers", Appl. Phys. Lett. Vol.62 PP.1020-1022 (1993)
3. **W.-H.Soe**, T.Kaizuka, R.Yamamoto and T.Mitsubishi, "Measurements of transport properties of Ag/Al and Ag/Cu multilayered films", J. Magn. Magn. Mater. Vol.126 PP.457-459 (1993)
4. Y.Yamamoto, H.Matsubara, M.Yamaguchi, T.Oguchi, I.Kanazawa, Y.Itoh, S.Takamura, **W.-H.Soe**, A.Yamaguchi and R.Yamamoto, "Cu-Hf multilayers studied by slow positron beam and time differential perturbed angular correlation", J. Magn. Magn. Mater. Vol.126 PP.170-172 (1993)
5. **W.-H.Soe**, Y.Song and R.Yamamoto, "Annealing effects in Au/Co multilayered films", Annales de chimie-Science des matériaux. Vol.18 PP.409-414 (1993)
6. H.Matsubara, Y.Yamamoto, I.Kanazawa, T.Iwashita, Y.Ito, S.Takamura, A.Yamaguchi, **W.-H.Soe** and R.Yamamoto, "Studies of multilayers of Cu-Hf with a variable-energy positron beam", Hyperfine Interact. Vol.84 PP.159-164 (1994)

7. N.Oshima, T.Nakajyo, I.Kanazawa, T.Iwashita, Y.Ito, **W.-H.Soe** and R.Yamamoto, "Multilayered Ni/Hf and solid-state amorphization studied using the slow positron beam technique", *Appl. Surf. Sci.* Vol.85 PP.329-333 (1995)
8. M.Tashiro, T.Nakajyo, Y.Murashige, T.Koizumi, I.Kanazawa, F.Komori, **W.-H.Soe**, R.Yamamoto and Y.Ito, "The study of multilayers Fe/Hf and Ni/Hf by slow positron beam technique", *Appl. Surf. Sci.* Vol.116 PP.263-267 (1997)
9. **W.-H.Soe** and R.Yamamoto, "Mechanical properties of polycrystalline TiN/TaN multilayers", *J. Mater. Sci. Technol.* Vol.13 PP.245-248 (1997)
10. **W.-H.Soe** and R.Yamamoto, "Mechanical properties of ceramic multilayers: TiN/CrN, TiN/ZrN, and TiN/TaN", *Mater. Chem. Phys.* Vol.50 PP.176-181 (1997)
11. A.Yoshihara, **W.-H.Soe** and R.Yamamoto, "Brillouin scattering from TiN/ZrN superlattices", *Physica B* Vol.263-264 PP.70-72 (1999)
12. A.Yoshihara, **W.-H.Soe** and R.Yamamoto, "Brillouin scattering study of elastic properties of transition-metal nitride superlattices", *Jpn. J. Appl. Phys.* Vol.38 PP.3072-3075 (1999)
13. **W.-H.Soe** and R.Yamamoto, "Elastic and plastic properties of TiN based ceramic multilayers: TiN/CrN, TiN/ZrN, and TiN/TaN", *Radiation Effects and Defects in Solid* Vol.148 PP.213-231 (1999)
14. Y.M.Zhou, R.Asaki, **W.-H.Soe**, R.Yamamoto, R.Chen, and A.Iwabuchi, "Hardness anomaly, plastic deformation work and fretting wear properties of polycrystalline TiN/CrN multilayers", *Wear* Vol.236 PP.159-164 (1999)
15. Y.M.Zhou, R.Asaki, **W.-H.Soe**, R.Yamamoto, R.Chen, and A.Iwabuchi, "Adhesion and fretting behaviors of TiN, CrN and TiN/CrN superlattices", *Trans. Mater. Res. Soc. Jpn.*, Vol.24 PP.125-128 (1999)
16. H.Mizubayashi, S.Iwasaki, T.Yamaguchi, Y.Yoshihara, **W.-H.Soe** and R.Yamamoto, "High thermal stability associated with supermodulus effect found in Ag/Pd multilayer films", *J. Magn. Mater.* Vol.198-199 PP.605-607 (1999)
17. Y.M.Zhou, R.Asaki, K.Higashi, **W.-H.Soe**, and R.Yamamoto, "Sliding wear behavior of polycrystalline TiN/CrN multilayers against an alumina ball", *Surf. Coating Tech.* Vol.130 PP.9-14 (2000)
18. **W.-H.Soe**, A.M.Shikin, F.Moresco, V.K.Adamchuk, and K.-H.Rieder, "HREELS-investigation of graphite monolayer stripes formed on stepped Ni(771)", *Phys. Rev. B* 64 P.235404(1-5) (2001)
19. A.M.Shikin, G.V.Prudnikava, V.K.Adamchuk, **W.-H.Soe**, K.-H.Rieder, S.L.Molodtsov, and C.Laubschat, "Synthesis of graphite monolayer stripes on stepped Ni(771) surface", *Phys. Solid State* Vol.44 PP.677-680 (2002)

20. **W.-H. Soe**, K.-H. Rieder, A.M. Shikin, V. Mozhaikii, A. Varykholov, and O. Rader, "Surface phonon and valence band dispersions in graphite overlayers formed by solid-state graphitization of 6H-SiC(0001)", *Phys. Rev. B* 70 P.115421(1-6) (2004)
21. K. F. Braun, **W.-H. Soe**, C. F. J. Flipes, and K.-H. Rieder, "Electromigration of single metal atoms observed by scanning tunneling microscopy", *Appl. Phys. Lett.* Vol.90 P.023118 (2007)
22. A. De Sarkar, C. Manzano, **W.-H. Soe**, N. Chandrasekhar, A. Gourdon, and C. Joachim, "Conformational dependence of tag induced intramolecular STM contrast in hexaphenylbenzen molecules", *Surf. Sci.* Vol.603 PP.L57-L61 (2009)
23. **W.-H. Soe**, C. Manzano, A. De Sarkar, N. Chandrasekhar, and C. Joachim, "Direct Observation of Molecular Orbitals of Pentacene Physisorbed on Au(111) by Scanning Tunneling Microscope", *Phys. Rev. Lett.* Vol.102 P.176102 (2009)
24. C. Manzano, **W.-H. Soe (co-first author)**, H. S. Wong, F. Ample, A. Gourdon, N. Chandrasekhar, and C. Joachim, "Step-by-step rotation of a molecule-gear mounted on an atomic-scale axis", *Nature Materials* Vol.8 PP.576-579 (2009)
25. **W.-H. Soe**, C. Manzano, N. Renaud, P. de Mendoza, A. De Sarkar, F. Ample, M. Hliwa, A. M. Echavarren, N. Chandrasekhar, and C. Joachim, "Manipulating Molecular Quantum States with Classical Metal Atom Inputs: Demonstration of a Single Molecule NOR logic Gate", *ACS Nano* Vol.5 PP.1436-1440 (2011)
26. **W.-H. Soe**, C. Manzano, A. De Sarkar, F. Ample, N. Chandrasekhar, N. Renaud, P. de Mendoza, A. M. Echavarren, M. Hliwa, and C. Joachim, "Demonstration of a NOR logic gate using a single molecule and two surface gold atoms to encode the logical input", *Phys. Rev. B* 83 P.1155443 (2011)
27. C. Manzano, **W.-H. Soe**, H. Kawai, M. Saeys, and C. Joachim, "Origin of the apparent (2x1) topography of the Si(100)-c(4x2) surface observed in low-temperature STM images", *Phys. Rev. B* 83 P.201302(R) (2011)
28. **W.-H. Soe**, H. S. Wong, C. Manzano, M. Grisolia, M. Hliwa, X. Feng, K. Müllen, and C. Joachim, "Mapping the Excited States of Single Hexa-peri-benzocoronene Oligomers", *ACS Nano* Vol.6 PP.3230-3235 (2012)
29. **W.-H. Soe**, C. Manzano, and C. Joachim, "Mapping the first electronic resonances of a Cu-Phthalocyanine STM tunnel junction", *J. Phys.: Condens. Matter* Vol.24 P.354011 (2012)
30. C. Manzano, **W.-H. Soe**, M. Hliwa, M. Grisolia, H. S. Wong, and C. Joachim, "Manipulation of a single molecule ground state by means of gold atom contacts", *Chem. Phys. Lett.* Vol.587 PP.35-39 (2013)

31. R. Dorel, C. Manzano, M. Grisolia, **W.-H. Soe**, C. Joachim, A.M. Echavarren, "Tetrabenzocircumpirene: A Nanographene with an Embedded Peripentacene Core", *Chem. Commun.* Vol.51 PP.6932-6935 (2017)
32. R. Pawlak, T. Meier, N. Renaud, M. Kisiel, A. Hinaut, T. Glatzel, D. Sordes, C. Durand, **W.-H. Soe**, A. Baratoff, C. Joachim, C.E. Housecroft, E.C. Constable, and E. Meyer, "Design and Characterization of an Electrically Powered Single Molecule on Gold", *ACS Nano* Vol.11 PP.9930-9940 (2017)
33. **W.-H. Soe**, Y. Shirai, C. Durand, Y. Yonamine, K. Minami, X. Bouju, M. Kolmer, K. Ariga, C. Joachim, and W. Nakanishi, "Conformation Manipulation and Motion of a Double Paddle Molecule on an Au(111) Surface", *ACS Nano* Vol.11 PP.10357-10365 (2017)
34. **W.-H. Soe**, C. Durand, O. Guillermet, S. Gauthier, H.-P. Jacquot de Rouville, S. Srivastava, C. Kammerer, G. Rapenne, and C. Joachim, "Surface manipulation of a curved polycyclic aromatic hydrocarbon-based nano-vehicle molecule equipped with triptycene wheels", *Nanotechnology* Vol.29 P.495401 (2018)
35. **W.-H. Soe**, C. Manzano, P. de Mendoza, P.R. McGonigal, A.M. Echavarren, and C. Joachim, "Long starphene single molecule NOR Boolean logic gate", *Surf. Sci.* Vol.678 PP.163-168 (2018)
36. **W.-H. Soe**, C. Durand, and C. Joachim, "Low temperature two STM tip tunneling measurements of a floating chemical potential Pb(111) surface", *Eur. Phys. J. Appl. Phys.* Vol.87 P.31001 (2019)
37. **W.-H. Soe**, S. Srivastava, and C. Joachim, "Train of Single Molecule-Gears", *J. Phys. Chem. Lett.* Vol.10 PP.6462-6467 (2019)
38. **W.-H. Soe**, C. Manzano, R. Robles, N. Lorente, and C. Joachim, "On-Surface Atom-by-Atom-Assembled Aluminum Binuclear Tetrabenzophenazine Organometallic Magnetic Complex", *Nano Lett.* Vol.20 PP.384-388 (2020)
39. **W.-H. Soe**, C. Manzano, and C. Joachim, "A tetrabenzophenazine low voltage single molecule XOR quantum Hamiltonian logic gate", *Chem. Phys. Lett.* Vol.748 P.137388 (2020)
40. **W.-H. Soe**, M. Kleinwächter, C. Kammerer, G. Rapenne, and C. Joachim, "Mechanics of Molecule-Gears with Six Long Teeth", *J. Phys. Chem. C* Vol.124 PP.22625-22630 (2020)
41. **W.-H. Soe**, P. de Mendoza, A.M. Echavarren, and C. Joachim, "A Single Molecule Digital Full Adder", *J. Phys. Chem. Lett.* Vol.12 PP.8528-8532 (2021)
42. **W.-H. Soe**, R. Robles, P. de Mendoza, A.M. Echavarren, N. Lorente, and C. Joachim, "Doublet-Singlet-Doublet Transition in a Single Organic Molecule Magnet On-Surface Constructed with up to 3 Aluminum Atoms", *Nano Lett.* Vol.21 PP.8317-8323 (2021)

Conference Proceedings

1. **W.-H.Soe**, A.Yamaguchi and R.Yamamoto, "Computer simulation of magneto-optical Kerr effect of multilayered films" *Proc. of CAMSE '90* (1991) 233-236.
2. T.Kaizuka, **W.-H.Soe**, R.Yamamoto and M.Ohyama, "The measurements of thermal conductivity of Ag/Al multilayered films" *Proc. of Mater. Res. Soc. Symp.* **229** (1991) 147-152.
3. A.Yamaguchi, **W.-H.Soe**, R.Yamamoto and M.Kobayashi, "The perpendicular magnetic anisotropy and structure of sputtered Ag/Co, Pd/Co, and AgPd/Co multilayered films" *Proc. of Mater. Res. Soc. Symp.* **231** (1991) 473-478.
4. **W.-H.Soe**, Y.Song and R.Yamamoto, "Annealing effects on transport properties and surface wave velocities in metallic multilayered films" *Proc. of 2nd Int'l Symp. on ISSP '93* (1993) 231-236.
5. H. Rao, P. Li, R. Fang, Y. Song, **W.-H. Soe** and R. Yamamoto, "Determination of the optical constants in Co/Cu multilayers using Kramers-Kronig relation" *Proc. of C-MRS and MRS-K joint Symp. '96.* (1996).
6. **W.-H.Soe**, T.Kitagaki, H.Ueda, N.Shima, M.Otsuka and R.Yamamoto, *Proc. of Mater. Res. Soc. Symp.* **458** (1997) 373-378.
7. **W.-H.Soe**, T.Kitagaki, H.Ueda, N.Shima, M.Otsuka and R.Yamamoto, "Structure and mechanical properties of titanium nitride, zirconium nitride, and chromium nitride films by reactive magnetron-sputter deposition" *Proc. of Mater. Res. Soc. Symp.* **458** (1997) 379-384.
8. T.Yang, **W.-H.Soe**, B.X.Liu and R.Yamamoto, "Perpendicular magnetic anisotropy and magneto-optical properties of sputtered RE-TM(CoGd)/Pd multilayered films" *Proc. of Mater. Res. Soc. Symp.* **458** (1997) 369-374.
9. **W.-H.Soe**, T.Kitagaki, H.Ueda, N.Shima, M.Otsuka and R.Yamamoto, "Structure and mechanical properties of reactive sputter deposited TiN/TaN multilayered films" *Proc. of Mater. Res. Soc. Symp.* **xv** (1998) 463-468.
10. K.-F.Braun, S.-W.Hla, N.Pertaya, **W.-H.Soe**, C.F.J.Flipse and K.-H.Rieder, "Force, Current and field effects in single atom manipulation" *AIP Conference Proceedings* **696** (2003) 109-116.

Books

1. 金属多層膜の力学的性質、「金属人工格子」(藤森 啓安、新庄 輝也、山本 良一、前川 禎通、松井 正顕 編)、徐 義孝、宋 亦周、山本 良一、アグネ技術センター(1995) 231-256.

2. 金属多層膜の異常弾性、徐 義孝、宋 亦周、山本 良一、日本金属学会分科会シンポジウム「金属薄膜・多層膜の新機能」(1995) 13-16.
3. Chapter “High voltage STM imaging of single Copper phthalocyanine” C. Manzano, **W.-H. Soe** and C. Joachim, “Imaging and manipulating molecular orbitals” Springer Series “Advances in Atom and Single Molecule Machines” Volume III (edited by L. Grill and C. Joachim) (2013) 15-26.
4. Chapter “Mapping the electronic resonances of single molecule STM tunnel junction”, **W.-H. Soe**, C. Manzano, and C. Joachim, “Imaging and manipulating molecular orbitals” Springer Series “Advances in Atom and Single Molecule Machines” Volume III (edited by L. Grill and C. Joachim) (2013) 57-67.
5. Chapter “Nanogears mechanics: from single molecule to the solid state”, **W.-H. Soe**, C. Troadec, C. Manzano, J.D. Deng, and C. Joachim, “Single molecular machines and motors” Springer Series “Advances in Atom and Single Molecule Machines” Volume VII (edited by G. Rapenne and C. Joachim) (2015) 187-196.
6. Chapter “In Building and Probing Small for Mechanic”, S. Srivastava, **W.-H. Soe**, C. Joachim, A Simple Example of a Molecule-Gear Train: PF₃ Molecules on a Cu(111) surface, Springer Series “Advances in Atom and Single Molecule Machines” Volume XII (edited by C. Joachim) (2020) 143-163.
7. Chapter “Transmission of Rotational Motion between Molecule-Gears”, **W.-H. Soe**, S. Srivastava, C. Joachim, Springer Series “Advances in Atom and Single Molecule Machines” Volume XII (edited by C. Joachim) (2020) 131-141.

Invited Talks

1. 金属多層膜の異常弾性、日本金属学会分科会シンポジウム「金属薄膜・多層膜の新機能」(1995).
2. “Plastic and elastic behavior of ceramic multilayers: structural origin of anomalous hardening”, *Atomic origin of stress and strain at surfaces*, Max-Planck-Institut fuer Mikrostrukturphysik Halle, Germany (1998).
3. “Imaging of molecular orbitals of a short molecule wire”, *The 9th International Conference on Molecular Electronics*, Kauai, USA, December 12-15 (2008).
4. “Manipulation and electronic characterization of single molecules by means of LT-STM”, *The 1st Singapore-Japan joint Workshop on Advances in Nanomaterials*, Singapore, April 19 (2010).

5. "Manipulation of molecular quantum states in an STM tunneling junction using classical metal atom inputs", *The 13th edition of Trends in Nanotechnology International Conference*, Madrid, Spain, September 10-14 (2012).
6. "Mapping the electronic resonances of single molecule STM tunnel junction", *The 3rd AtMol European Workshop*, Berlin, Germany, September 26-27 (2012).
7. "Imaging and manipulating molecular quantum states in an STM tunnel junction", *The 304th MANA Special Seminar*, Tsukuba, Japan, December 27 (2012).
8. "Nanogears mechnes: from a single molecule to the solid state", *International Symposium "Single Molecular Machines and Motors"*, Toulouse, France, June 19-20 (2013)
9. "Controllable single molecule gear", *The 18th edition of Trends in Nanotechnology International Conference*, Dresden, Germany, June 5-9 (2017).
10. "Floating Low Temperature Two STM Tips Measurements on a Pb(111) Surface", 3rd International Workshop on "Charge Transport with Multi-Tip STM Techniques", Jülich, Germany, September 19-21 (2018).