

Curriculum Vitae

Name Koichiro Umemoto
Sex Male
Date of Birth June 20, 1972
Place of Birth Tokyo
Nationality Japanese
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Education

1995 Bachelor of Science, from Department of Physics, Tokyo Institute of Technology
1997 Master of Science, from Department of Physics, Tokyo Institute of Technology
2000 Doctor of Science, from Department of Physics, Tokyo Institute of Technology
April 2001 Research Student at the Department of Physics, Tokyo Institute of
~July 2001 Technology

Employment

April 2000 Research Associate at the Department of Physics, Tokyo Institute
~ March 2001 of Technology, Japan
August 2001 Post-doctoral researcher, Condensed Matter Physics, Scuola
~November 2002 Internazionale Superiore di Studi Avanzati (SISSA), Italy.
December 2001 Post-doctoral researcher, Department of Chemical Engineering
~ August 2003 and Material Science, University of Minnesota
August 2003 Research Associate, Department of Chemical Engineering and

~ May 2005 Material Science, University of Minnesota
May 2005 Information Technology Professional, Minnesota
~ present Super-computing Institute, University of Minnesota

Award

July 1, 2004 Research scholarship at Minnesota Supercomputing Institute
~ June 30, 2005

Areas of Research

- First-principles simulations of material properties at high pressure and temperature
- Prediction of new phases
- Phase transitions in earth and planetary materials (H₂O ice, MgSiO₃ and their related materials)
- Electronic structure of fullerenes and magnetic materials

Recent Collaborators

Renata Wentzcovitch (CEMS and MSI, University of Minnesota), Stefano Baroni and Stefano de Gironcoli (Scuola Internazionale Superiore di Studi Avanzati (SISSA), Italy), Chris Leighton (MRSEC, University of Minnesota), Philip B. Allen, Donald Weidner, and John Parise (SUNY-Stony Brook, NY), Taku Tsuchiya and Jun Tsuchiya (Ehime University)

Other professional activities

- Memberships: American Physical Society, The Physical Society of Japan, The Japan Society of High Pressure Science and Technology
- Referee for journals: Physical Review Letters, Physical Review B, Journal of the Physical Society of Japan

Publication list

1. "Electronic Configurations of Superheavy Elements",
K. Umemoto and S. Saito,
J. Phys. Soc. Jpn. **65**, 3175 (1996).
2. "Electronic Structure of $K_3Ba_3C_{60}$ and $Rb_3Ba_3C_{60}$ Superconductors",
K. Umemoto, S. Saito, and A. Oshiyama,
Phys. Rev. B **60**, 16 186 (1999).
3. "Hybridization between K and C Electronic States in Superconducting $K_3Ba_3C_{60}$ ",
K. Umemoto and S. Saito,
Mol. Cryst. and Liq. Cryst. **340**, 605 (2000).
4. "Electronic Structure of Ba_4C_{60} Superconductors",
K. Umemoto and S. Saito,
Phys. Rev. B **61**, 14 204 (2000).
5. "Electronic Structure of Body-Centered-Lattice Fullerides",
S. Saito and K. Umemoto,
Proc. International Winterschool on Electronic Properties of Novel Materials (Austria, March 4-11, 2000), 14
6. "Electronic Structure of superconducting Ba_4C_{60} and Cs_4C_{60} ",
K. Umemoto and S. Saito,
Fullerene and Nanotube network news (in Japanese).
7. "Electronic Structure of Ba_4C_{60} and Cs_4C_{60} ",
K. Umemoto and S. Saito,
Proceedings of International Symposium on Nanonetwork Materials: Fullerenes, Nanotubes, and Related Systems (Kamakura, Japan, January 15-18, 2001), 305.
8. "Carbon foam: Spanning the phase space between graphite and diamond",
K. Umemoto, S. Saito, S. Berber, and D. Tomanek,

- Phys. Rev. B **64**, 193409 (2001).
9. "Effect of External Carriers on the Electronic Structure of C₆₀ Fullerite and Fulleride"
K. Umemoto and S. Saito,
New Diamond and Frontier Carbon Technology Journal, **12**, 263 (2002).
10. "Hierarchical Assembly of Nanostructured Carbon Foam"
D. Tomanek, S. Berber, K. Umemoto, and S. Saito,
Mol. Cryst. and Liq. Cryst. **386**, 189 (2002).
11. "Anomalous pressure-induced transition(s) in ice XI",
K. Umemoto, R. M. Wentzcovitch, S. Baroni, and S. de Gironcoli,
Phys. Rev. Lett. **92**, 105502 (2004).
12. "Amorphization in quenched ice VIII: a first principles study",
K. Umemoto and R. M. Wentzcovitch,
Phys. Rev. B **69**, 180103 (R) (2004).
13. "Energetics and Structural Stability of Cs₃C₆₀",
S. Saito, K. Umemoto, S. G. Louie, and M. L. Cohen,
Solid State Commun. **130**, 335 (2004).
14. "Electronic Structure and Energetics of Fullerites, Fullerides, and Fullerene Polymers",
S. Saito, K. Umemoto, and T. Miyake,
Structure and Bonding **109**, 41-57 (2004).
15. "Phase transition in MgSiO₃-perovskite in the Earth's lower mantle",
T. Tsuchiya, J. Tsuchiya, K. Umemoto, and R. M. Wentzcovitch,
Earth and Planet. Sci. Lett. **224**, 241 (2004).
16. "Elasticity of post-perovskite MgSiO₃",
T. Tsuchiya, J. Tsuchiya, K. Umemoto and R. M. Wentzcovitch,
Geophys. Res. Lett. **31**, L14603 (2004).

17. “Theoretical reinvestigation of the isostructural transformation in ice VIII”,
K. Umemoto and R. M. Wentzcovitch, Phys. Rev. B **71**, 012102 (2005).
18. “Low \Leftrightarrow high density transformations in ice”,
K. Umemoto and R. M. Wentzcovitch, Chem. Phys. Lett. **405**, 59 (2005).
19. “Co_{1-x}Fe_xS₂: A Tunable Source of Highly Spin-Polarized Electrons”,
L. Wang, K. Umemoto, R. M. Wentzcovitch, T. Y. Chen, C. L. Chien, J. G. Checkelsky, J. C. Eckert, E. D. Dahlberg, and C. Leighton, Phys. Rev. Lett. **94**, 056602 (2005) (published also in Virtual Journal of Nanoscale Science & Technology **11**,
(<http://scitation.aip.org/dbt/dbt.jsp?KEY=VIRT01&Volume=11&Issue=8>)).
20. “Prediction of dissociation of MgSiO₃ in the gas giants and in terrestrial exoplanets”,
K. Umemoto, R. M. Wentzcovitch, and P. B. Allen, Science **311**, 983 (2006).
21. “Composition controlled spin polarization in Co_{1-x}Fe_xS₂: Electronic, magnetic, and thermodynamic properties”,
L. Wang, T. Y. Chen, C. L. Chien, J. G. Checkelsky, J. C. Eckert, E. D. Dahlberg, K. Umemoto, R. M. Wentzcovitch, C. Leighton, Phys. Rev. B **73**, 144402 (2006).
22. “NaMgF₃: a low-pressure analog of MgSiO₃”,
K. Umemoto, R. M. Wentzcovitch, D. Weidner, and J. Parise, Geophys. Res. Lett. **33**, L15304 (2006).
23. “Potentially novel ultrahigh pressure polymorphs of ABX₃-type compounds”,
K. Umemoto and R. M. Wentzcovitch, Phys. Rev. B **74**, 224105 (2006).
24. “First Principles Investigation of Ringwoodite’s Dissociation”,
Y. Yonggang, R. M. Wentzcovitch, T. Tsuchiya, K. Umemoto, J. Tsuchiya, and D. J. Weidner (in preparations for Geophys. Res. Lett.).
25. “P-V-T relations in MgO: an ultra-high PT scale for planetary sciences applications”,
Z. Wu, R. M. Wentzcovitch, B. Li, K. Umemoto, and K. Hirose (in preparation for J. Geophys. Res.)

26. "Order-disorder phase transition between ice VII and VIII by first principles"

K. Umemoto, R. M. Wentzcovitch, S. de Gironcoli, and S. Baroni (in preparation for Phys. Rev. Lett.).

Dr. Thesis:

"Electronic Structure of Superconducting Fullerides: First-Principles Study"