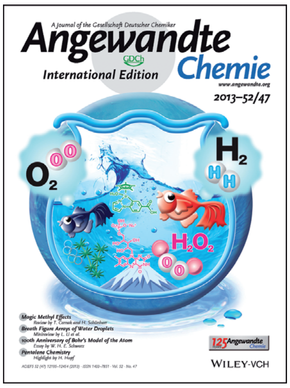
S. Fukuzumi

*The author presented on this page has published more than **25 articles** since 2000 in Angewandte Chemie, the most recent of which was featured on the cover:*
"Direct Synthesis of Hydrogen Peroxide from Hydrogen and Oxygen by Using a Water-Soluble Iridium Complex and Flavin Mononucleotide": S. Shibata, T. Suenobu, S. Fukuzumi, *Angew. Chem.* **2013**, *125*, 12553; *Angew. Chem. Int. Ed.* **2013**, *52*, 12327.



Shunichi Fukuzumi

Date of birth: January 18, 1950
Position: Distinguished Professor, Osaka University
E-mail: fukuzumi@chem.eng.osaka-u.ac.jp
Homepage: http://www-etchem.mls.eng.osaka-u.ac.jp/mlset010/English/Welcome_to_Fukuzumis_Group.html

Education: 1973 BS, Tokyo Institute of Technology
1978 PhD with Tominaga Keii, Tokyo Institute of Technology
1978–1981 Postdoctoral position with Prof. Jay K. Kochi, Indiana University

Awards: **2005** The Chemical Society of Japan (CSJ) Award; Osaka University Award; **2006** *Bull. Chem. Soc. Jpn.* Award; **2007** Honorary degree from Tampere University of Technology, Finland; **2010** The Commendation for Science and Technology by the Japanese Minister of Education, Culture, Sports, Science and Technology; **2011** Special Lectureship Award, The Japanese Photochemistry Association; Medal with Purple Ribbon from the Emperor of Japan; **2012** NIMS Award; Roseman Award; **2013** Presidential Award, Osaka University

Current research interests: Bioinspired artificial photosynthetic systems composed of well-designed organic electron donor–acceptor ensembles and catalytic systems for artificial photosynthesis and also catalytic reduction of O_2. These systems consist of five units: 1) the light-harvesting unit, 2) the charge-separation unit, 3) the catalytic unit for water reduction, 4) the catalytic unit for water oxidation, and 5) the catalytic CO_2 fixation unit. Photocatalytic oxidation of water by O_2 to produce hydrogen peroxide has been studied together with hydrogen peroxide fuel cells.

Hobbies: Oil painting

If I were not a scientist, I would be … a historian and clarify many mysteries in Japanese history.

I like refereeing because … I can send more papers to journals without feeling guilty.

My worst nightmare is … to think I am on the right track but then find later it was in fact in the totally wrong direction.

Guaranteed to make me laugh is … when somebody tries to take my picture.

The best advice I have ever been given is … "Challenge your limits".

I celebrate success by … drinking with people who made it possible.

The downside of my job is … filling out many administrative documents by hand.

When I'm frustrated, I … eat the very best Japanese food.

My top three films of all time are … *Eien no zero* (*The Eternal Zero*; the movie of a book that sold four million copies), *Seppuku* (*Harakiri*), and *Rashomon* (both directed by Akira Kurosawa).

My favorite food is … miso-nicomi noodles in Nagoya, Japan.

My favorite saying is … "where there is a will, there is a way".

If I won the lottery, I would … give it all to my wife in order to secure my future.

If I could have dinner with three famous scientists from history, they would be … Dmitri Mendeleev, Fritz Haber, and Linus Pauling.

And I would ask them … the same questions I am answering here.

My best investment was … taking a quantum mechanics course when I was a chemistry student.

My greatest achievement has been … the attainment of an extremely long lifetime of the electron-transfer state of a simple electron donor–acceptor dyad (9-mesityl-10-methylacridinium ion), which is even longer than the lifetime of the charge-separated state in the photosynthetic reaction center.

How is chemistry research different now than at the beginning of your career?

I design many experiments and my young students get interesting results, which I could not obtain by myself. Discussion with many young researchers and writing papers on their exciting results keep me busy and healthy. At the beginning of my career, it took a long time to find appropriate references in a library. Typing papers and drawing reaction schemes and figures was a pain. Now it is so easy to get references from databases, type papers, and draw reaction schemes and figures by using a personal computer. I can spend much more time for focusing on chemistry research without wasting time on tedious work. At the same time, however, I have to spend more time responding to e-mails and writing other sorts of articles, which I had never imagined doing at the beginning of my career.

What is the secret to publishing so many high-quality papers?

I have been trying to expand my research based on my previous achievements. When designed experiments go well, I can write good papers. When something goes differently to my original expectations, I may have a big chance to find out something really new, which does not fit with current knowledge. When students tell me that original ideas do not work at all, I am more excited than being told that everything goes as expected. In such a case, I lose track of time when trying to resolve the serious contradiction. Thus, in any case, I can publish high-quality papers. In addition, writing one paper results in getting more than one idea, and then my research will hopefully expand like a branched chain reaction.

My 5 top papers:

1. "Charge Separation in a Novel Artificial Photosynthetic Reaction Center Lives 380 ms": H. Imahori, D. M. Guldi, K. Tamaki, Y. Yoshida, C. Luo, Y. Sakata, S. Fukuzumi, *J. Am. Chem. Soc.* **2001**, *123*, 6617–6628.
   An extremely long-lived charge-separated state was successfully achieved using a ferrocene–zincporphyrin–freebaseporphyrin–fullerene tetrad, which reveals a cascade of photoinduced energy transfer and multistep electron transfer processes. This is the first report of a long-lived charge-separated state comparable to that in the photosynthetic reaction center.
2. "Formation of a long-lived electron-transfer state in nanosized mesoporous silica-alumina enhances photocatalytic oxidation reactivity with a copper complex": S. Fukuzumi, K. Doi, T. Suenobu, K. Ohkubo, Y. Yamada, K. D. Karlin, *Proc. Natl. Acad. Sci. USA* **2012**, *109*, 15572–15577.
   A nanosized mesoporous silica alumina was utilized to stabilize the electron-transfer state of a simple electron donor–acceptor dyad cation (the 9-mesityl-10-methylacridinium ion) by a cation-exchange reaction. This is the first report where the lifetime of the electron-transfer state is longer than the lifetime of the charge-separated state in the photosynthetic reaction center at room temperature.
3. "Crystal structure of a metal ion-bound oxoiron(IV) complex and implications for biological electron transfer article": S. Fukuzumi, Y. Morimoto, H. Kotani, P. Naumov, Y.-M. Lee, W. Nam, *Nat. Chem.* **2010**, *2*, 756–759.
   This is the first reported example of the binding of metal ions such as Sc^{3+} and Ca^{2+} to a nonheme oxoiron(IV) complex, $[(TMC)Fe^{IV}(O)]^{2+}$ (TMC = 1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane), and the crystal structure of Sc^{3+}-bound $[(TMC)Fe^{IV}(O)]^{2+}$ was determined by X-ray crystallography. The binding of Sc^{3+} to $[(TMC)Fe^{IV}(O)]^{2+}$ and the resulting change in the redox behavior provide valuable mechanistic insights into oxometal redox chemistry, suggesting a possible key role that auxiliary Lewis acid metal ions could play in nature, such as in photosystem II.
4. "Catalysis of Nickel Ferrite for Photocatalytic Water Oxidation Using $[Ru(bpy)_3]^{2+}$ and $S_2O_8^{2-}$": D. Hong, Y. Yamada, T. Nagatomi, Y. Takai, S. Fukuzumi, *J. Am. Chem. Soc.* **2012**, *134*, 19572–19575.
   $NiFe_2O_4$ exhibits the highest reported activity for the photocatalytic water oxidation, with robustness and ferromagnetic properties that are beneficial for easy recovery from a solution after reaction. Such water oxidation catalysis achieved by a composite of earth-abundant metals contributes to a new approach to design catalysts for artificial photosynthesis.
5. "Production of hydrogen peroxide as a solar fuel from water and dioxygen": S. Kato, J. Jung, T. Suenobu, S. Fukuzumi, *Energy Environ. Sci.* **2013**, *6*, 3756–3764.
   This is the first report of the production of hydrogen peroxide from water and dioxygen with a high turnover number and quantum yield using solar energy. An efficient water oxidation catalyst was combined with a photosensitizer and scandium ion that acts as a Lewis acid and facilitates the two-electron reduction of dioxygen. This study will pave a way to utilize hydrogen peroxide as a sustainable solar fuel in a hydrogen peroxide fuel cell.

DOI: 10.1002/anie.201400648