MAW-KUEN WU

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Birth Date: December 6, 1949
Birth Place: Hualien County, Taiwan
Citizenship: Taiwan

Education:

1981	Ph. D., Physics, University of Houston, USA
1975	M.S., Physics, Tamkang University, Taiwan
1973	B.S., Physics, Tamkang University, Taiwan

Experience:

1982-1984	Research Scientist in Physics, University of Houston
1984-1987	Assistant Professor of Physics, University of Alabama in Huntsville
1987-1988	Professor of Physics, University of Alabama in Huntsville
1988-1993	Professor of Applied Physics, Columbia University
1989-1993	Visiting Chair Professor, National Tsing Hua University
1992-1995	Director, Materials Science Center, National Tsing Hua University
1994-present	Professor, National Tsing Hua University
1995-1998	Chairman, Research and Development Council, National Tsing Hua University
2000-2002	Deputy Minister, The ROC National Science Council
2002-2004	Director, Institute of Physics, Academia Sinica
2004-2006	Minister, The ROC National Science Council
2006-present	Director, Institute of Physics, Academia Sinica

Honors:

1988	U.S.A. National Academy of Science Comstock Prize
1988	NASA Special Awards
1988	University of Alabama Research Award
1988	State of Alabama Resolution
1988	USA Chinese Association of Engineering Annual Award
1989	Tamkang Golden Eagle Award
1994	Bernd T. Matthias Prize
1994	Fellow, Chinese Physical Society
1995	Y. T. Lee Outstanding Scientist Award
1998	Elected Member, Academia Sinica
2004	Elected Foreign Associate, US National Academy of Sciences
2004	Elected Member, Academy of the Developing Countries (TWAS)
2008	Ettore Majorana-Erice-Science for Peace Prize 2007

Summary of Maw-Kuen Wu's professional activities

Dr. M. K. Wu has been actively involved in superconductivity and magnetism research since 1978. During his early research career (1978-1981) as a Ph.D. student under Professor C.W. Chu, he made several major observations listed in the following:

1. Pressure induced superconductivity in Eu-based Chevrel phase compound (Phys. Rev. Lett., 46, 276, 1981 ; Phys. Rev., B26, 5230, 1982).

2. Experimental evidence of the competition between ferromagnetic coupling and antiferromagnetic coupling as the origin of the spin glass state in intermetallic compound Pd-Fe-Mn (Phys. Rev. Lett., 46, 1643, 1981).

3. The existence of a superconducting transition temperature (T_c) maximum in perovskite oxide superconductor under pressure (Phys. Rev., B24, 4075, 1981).

In 1984 – 1989, as professor of physics at the University of Alabama in Huntsville, and later as Professor of Applied Physics at Columbia University, his major research accomplishments can be summarized in the following:

1. Observed the gravitational effect on T_c in immiscible metallic alloys (Metallurgical Transaction, A18, 1511, 1987).

2. Discovery of superconductor with T_c above liquid nitrogen temperature (in collaboration with Prof. C.W. Chu) (Phys. Rev. Lett., 58, 908, 1987; Phys. Rev. Lett. 58, 911, 1987). *This was one of the major breakthroughs in the field of superconductivity.*

3. Developed a non-equilibrium processing technique to synthesize cuprate high temperature superconductors (Phys. Rev., B37, 9765, 1988 ; Appl. Phys. Lett., 52, 1915, 1988).

4. First observed the magnetic suspension effect in high T_c superconductors with strong flux pinning effect (Appl. Phys. Lett., 52, 2066, 1988). *This observation was believed to have important impact on the subsequent development of high Tc superconductors with strong pinning effect.*

During 1990-2000, M.K. Wu returned to Taiwan to organize a research team working on high T_c superconductors and other oxide compounds that exhibit strong electron-correlated effects at the National Tsing Hua University. Some of the research results, in collaboration with his colleagues at the Materials Science Center are:

1. Enhancement of phase stability in high T_c oxides by addition of metallic oxides (Chinese J. Phys., 28, 9, 1990 ; Materials Chemistry and Physics, 34, 185, 1993 ; J. Appl. Phys., 73, 1, 1993).

2. Observation of the vortex-glass-vortex liquid transition in $YBa_2Cu_3O_7$ system (Chinese J. Phys., 30, 253, 1992; High T_C Superconductivity and the C_{60} Family, ed. by S.Q. Feng and H.C. Ren, Gordon & Breach Publishing Inc., Vol.11, 155, 1995). *Established through detailed vortex state measurements the correlation between dimensional*

crossover and superconductivity in high Tc cuprate system.

3. Crystallization of perovskite superconductors by low temperature electrochemical deposition (Physica C, 231, 325, 1994; J.J.A.P., Vol. 32, L312, 1993; J. Electrochemical Soc. 144, p.16, 1997). *This was the first time a low temperature process was used to prepare high Tc superconductors. This process was awarded an US patent (No. 5545305).*

4. Development of a new synthetic route to the formation of alkaline-metal doped C_{60} superconductors (Appl. Phys. Lett., 65, 1, 1994; Appl. Superconductivity, 2, 1, 1995).

5. Development of a new technique to control and grow superconducting bi-epitaxial grain boundary junctions (J. Appl. Phys., 77, 1, 1995; Chinese J. Phys. 36, 355, 1998; Physica, C339, 155, 2000).

6. Observation of possible p-wave superconductor in Ru-based double perovskite compounds (Z. Physik B102, 37, 1997; Physica C.282-287, 73, 1997; Intl. J. Mod. Phys. **B**13, 3670, 1999; Eur. Phys. J. **B**15, 649, 2000; Phys. Rev. **B62**, 14301, 2000; Phys. Rev. B63, 4412, 2001). *This work demonstrated the possibility of unconventional high T_c superconductivity in non-copper based oxides, which also displayed highly interesting interplay between superconductivity and magnetism.*

After year 2002, Dr. Wu moved to the Institute of Physics. His research activities focused on the following topics:

1. The development of novel processes to grow oxide crystals, especially the Ru-based double perovskite compounds (Superconductor Sci. & Tech. , 14, 958, 2002; J. Crystal. Growth, 235 271, 2002; Crystal Res. And Tech., 41, 123, 2002; Phys. Lett. A324, 71, 2004; J. Mater. Chem., 15, 1375, 2005; J. Crystal Growth, 290, 490, 2006)
2. Collaborated with Prof. Chen of NCKU to jointly develop a new approach using nano-particles to enhance the pinning effect on high T_c superconductors **(**J. Electroceramics, 13, 857, 2004; Superconductor Sci. & Tech., 18, 916, 2005; Japan J. Appl. Phys., 44, 6002, 2005; J. Appl. Phys. 99, 508, 2006).
3. Together with collaborators at National Synchrotron Facility in Taiwan, Dr. Wu's team has studied the highly interested multiferroic material $LiCu_2O_2$. They observed magnetic order which could be closely associated with the orbital polarization of the unoccupied states. (Solid State Communications, 147, 234, 2008; Phys. Rev. Lett. 101,077205, 2008; .Phys. Rev. B, 78, 214105, 2008)
4. In 2008, Dr. Wu's team at Academia Sinica discovered a simple binary Iron based compound (FeSe) that superconducts at ~8K. This work provides an alternative route from the iron-arsenic based superconductors to study the interesting and exciting new Fe based superconductors. (Proc. Natl. Acad. Sci. 105, 14262, 2008; Euro. Phys. Lett. 84, 37002, 2008)

In addition to the scholarly contributions listed above, Dr. Wu has played an important overall role in Taiwan's materials science research community. After returning to Taiwan from the US in the early 1990s, Dr. Wu helped establish the infrastructure for superconductivity and low temperature physics and materials science research. His efforts covered the full spectra, from materials synthesis to low temperature and low temperature properties characterization. This has laid the groundwork for much of the novel oxide material researches listed above.

More recently, Dr. Wu has also served a significant leadership role in the larger academic and scientific community of Taiwan. He assumed the posts of deputy minister (2000-2002) and minister (2004-2006) of the National Science Council. In this capacity he began a National Initiative on Nanoscience & Nanotechnology research. This Initiative, begun in 2003, has received the most funding among all national research programs since 2003, and has further advanced the research capabilities not only conducive to achieving academic excellence, but also beneficial to developing new industrialization technologies.