



Photobook of **MANA's** History

(2007 – 2021)



Edited by :

Masakazu Aono

Executive Advisor (Founding Director), MANA

Tomonobu Nakayama

Deputy & Administrative Director, MANA

**Spread of ripples of nanoarchitectonics
to the world.**



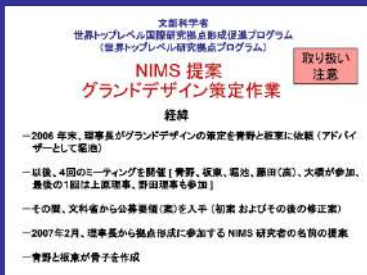
PREFACE

2007年、文部科学省は「世界トップレベル研究拠点プログラム」(WPI)を発足し、我々のNIMSはそれに応募して採択されました(日本全国で5拠点が採択)。こうして我々のMANA(International Center for Materials Nanoarchitectonics)がスタートしました。来年は15周年を迎えます。この間、MANAは世界のナノサイエンスとナノテクノロジーに多大の貢献をしてきたと自負しています。この機会に、その歴史を振り返るため、この写真集をまとめることにしました。

In 2007, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan created the WPI (World Premier International Research Center Initiative) Project. Our NIMS (National Institute for Materials Science) made application for it and the application was successfully adopted. As a result, MANA (International Center for Materials Nanoarchitectonics) was established. MANA is proud to have made significant contributions to nanoscience and technology around the world. Next year, MANA will reach a milestone of 15th anniversary. To look back its history, we have compiled this photobook.

文部科学省「WPI事業」(2007年発足)へのNIMSからの応募のグランドデザインを策定(2007年2月~8月)

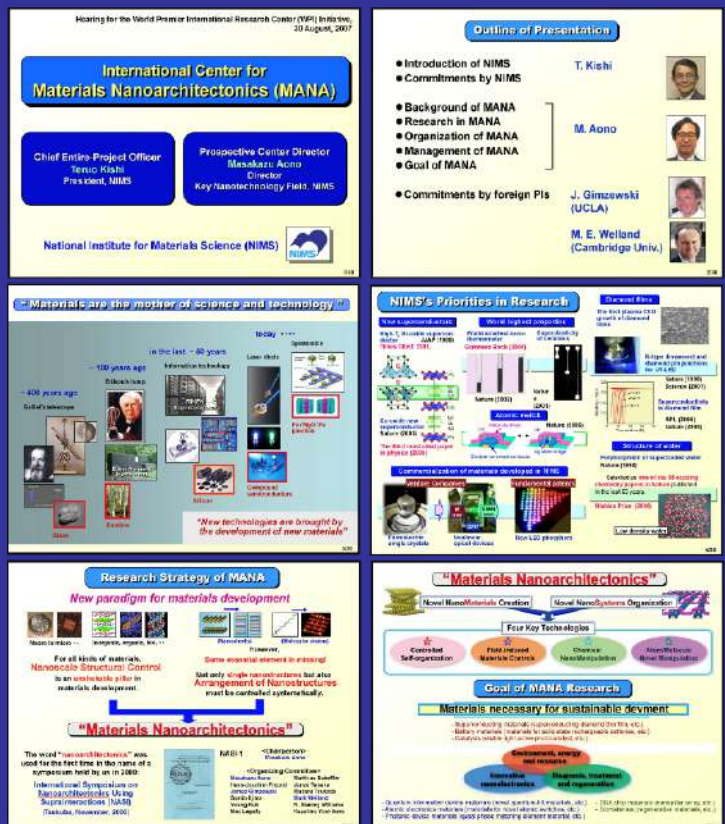
Creating a grand design for a new research center



Cover page (34 pages in total)

ヒアリング (2007年8月) において用いたスライド

Slides used for hearing (30 slides in total)



WPI 事業の研究拠点として **MANA** が採択された (2007年) (5 WPI 拠点の1つとして)

MANA was selected as one of 5 WPI centers.

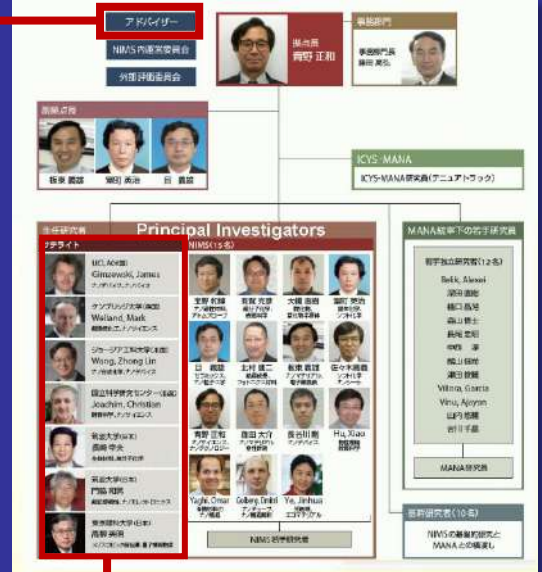
採択拠点を知らせる広報資料
Appointed WPI centers: press-release

World Premier International Research Center (WPI) Initiative
MEXT
Japan

Selected Projects

Host institution	Tohoku University	The University of Tokyo	Kyoto University	Osaka University	National Institute for Materials Science
Center name	WPI Advanced Institute for Materials Research (AIMR)	Institute for the Physics and Mathematics of the Universe (IPMU)	Institute for Integrated Cell-Material Sciences (iCeMS)	Osaka University Frontier Research Center (IFRC)	International Center for Materials Nanoarchitectonics (MANA)
Center Director	Yoshinori Yamamoto	Hiroshi Murayama	Norio Nakatsuji	Shizuo Akiyama	Masakazu Aono
Chief Project Officer	Yoshihisa Inoue	Hiroshi Komiya	Kazuo Oike	Kiyokazu Washida	Teruho Kishi

MANA発足当初の組織図
Organization of **MANA** at the beginning



Advisors included:

Heini Rohrer
Nobel Prize in Physics (1986)



Harry Kroto
Nobel Prize in Chemistry (1996)



MANA発足当初の4つの海外サテライト研究所

Four Satellite Labs. of **MANA** in the abroad at the beginning

MANA Satellite at California Nanosystems Institute, UCLA

MANA Satellite at Nanoscience Center, Cambridge Univ.

MANA Satellite at CNRS, Toulouse

MANA Satellite at Georgia Tech.

Spirit & Policy of MANA

Vision, Mission, Research Direction and Challenges



Panels placed in the entrance lobby of the WPI-MANA building (shown for example)

Our Vision
Oriented towards a better global future:
Pioneering a new paradigm for nanotechnology in public development.

Our Mission
Challenge to the development of grand-scale key new research on the basis of interdisciplinary coupling.
Creating a world leader university that transcends national boundaries to the world.
Realizing a new paradigm for nanotechnology research in the fields of science and technology.
Realizing a new paradigm for nanotechnology research in the fields of science and technology.

Nanoarchitectonics
Important Viewpoints

- 1. Create reliable nanomaterials or nanosystems from unreliable molecular structures (nanoparts) that are assembled or organized randomly.
- 2. Note that main players are not individual nanomaterials but their mutual interactions that cause an emergent functionality as a whole.
- 3. Do not overlook an emergent functionality caused by the coexistence of a large number of nanoparticles.
- 4. Create a new theory field where conventional first-principle computations are combined with novel bold approximation.

Three Grand Challenges of MANA

- ★ **Nanoarchitectonic Artificial Brain**
Creation of materials-based artificial brain, including neurobiological architectures, with the use of the nanoarchitectonic networks of functional nanomaterials (without using conventional computer devices and software).
- ★ **Room-temperature Superconductivity**
Materialization of novel nanoarchitectonic systems exhibiting superconductivity even at room temperature (nanoscale Meissner superconductivity).
- ★ **Practical Artificial Photosynthesis**
Realization of practical artificial photosynthesis by combining photochemical chemistry with physics and technology for efficient solar energy conversion and nanoarchitectonic system construction.

The fruits of your research are proportional to the number of your conversations with others.

研究成果は会話の数に比例する。

NEVER GIVE UP IN MANA

SAY NO TO NO IN MANA

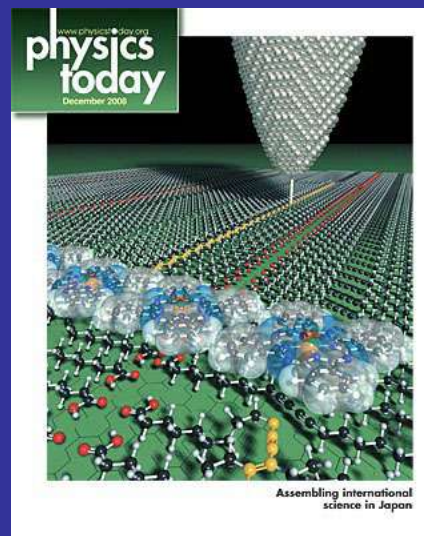
MANA はスタート当初から注目された

NHK ニュース “おはようニッポン” で
活動が紹介された (NHK morning news)

当時の研究が
Physics today の cover に



December 11, 2008



December 2008

(These are only examples !!)

2011. 3. 11 東日本大震災 マグニチュード9.0 (震源地は福島県沖)

Great East Japan Earthquake
Magnitude: 9.0
(Epicenter was off the coast of
Fukushima prefecture)



Fortunately, Tsukuba City was not seriously damaged. However, **MANA's** research facilities were considerably damaged.



復興を願うポスター
Poster wishing for recovery



Recovery !!!
after a month (April 2011)



(Made by M. Aono and 20 copies were posted in the building by himself on the next day.)

One billion yen was spent.

WPI-MANA 新棟の竣工（増設）!!!

Completion of **WPI-MANA** New Building (2012)



July 2012

理論研究棟の新設
Completion of
Theoretical Research
Building (2013)



WPI-MANA 棟の竣工式典

Completion Ceremony of
WPI-MANA New Building
新棟内のオーデイトリウムにて
(2012年7月5日)

Views in **WPI-MANA** building (2012)



Solaring
entrance hall



Lab space



Interaction space



Office space



Auditorium



Materials Nanoarchitectonicsが生み出す芸術 Materials Nano Art (MANAのArt)

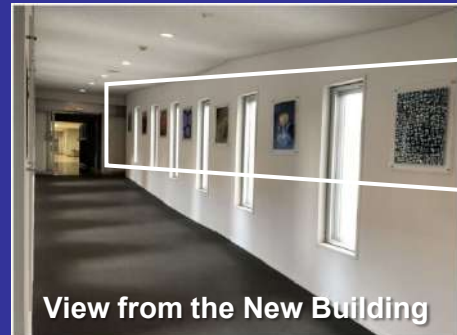


WPI-MANA新棟とMANA旧棟を結ぶ連結陸橋 New WPI-MANA Building --- Overpass --- Old MANA Building

この陸橋は「ひらめきの回廊」“Pathway for Brainstorming”と呼ばれている。

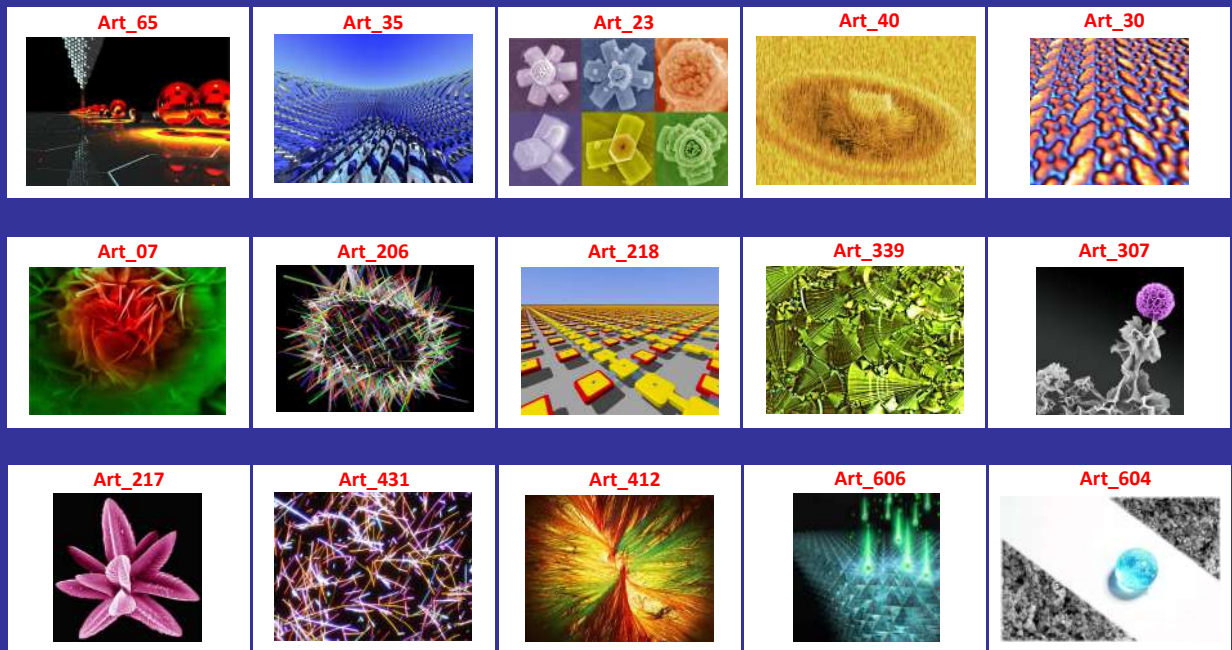


View from the Old Building
“Your old idea will be renewed”



View from the New Building
“Your new idea will be deepened”

Your brainstorming is enhanced by these scientific art pictures created by your colleagues in MANA (selected).



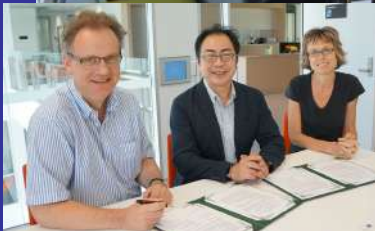
People supported **MANA** (1)

(many more indeed)



People supported MANA (2)

(many more indeed)



People supported **MANA** (3) (many more indeed)



第 8 回日英米ナノテクノロジー学生サマースクール

NIMS(Japan)- Cambridge/UCL(UK)- UCLA(USA) Nanotechnology Students' Summer School 2012

MANA の組織の変遷

Changes in MANA organization (only for selected years)

2009



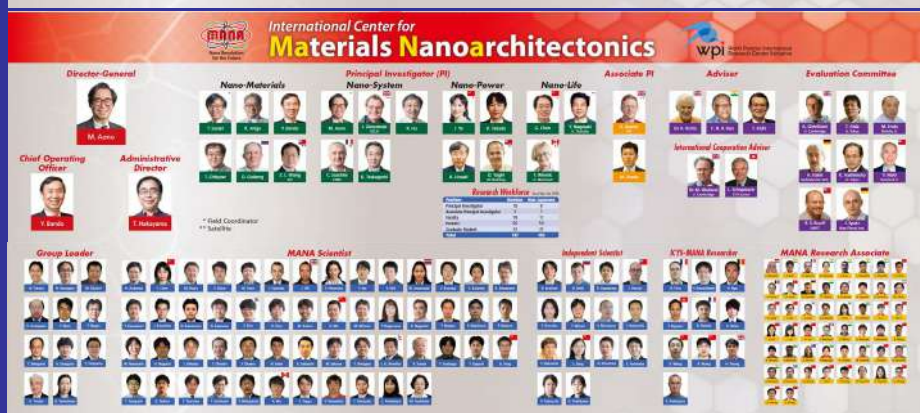
2010



2012



2015



2016



2018



2021



Message from the new director of **MANA**
 Dr. Takashi Taniguchi



<https://www.nims.go.jp/mana/jp/about/message.html>

MANA has been opening “MANA International Symposium” every year (2008-2021)

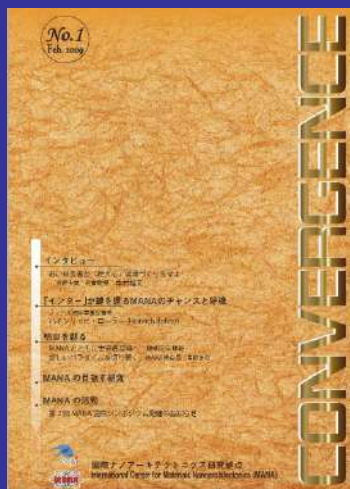
Inauguration of MANA



Most recent symposium



MANA has been publishing MANA News Letter “CONVERGENCE” regularly (Japanese and English versions at the same time)



創刊号 (No. 1)
(February 2009)



MANA 10周年記念号 (No. 25)
(February 2017)



最新号 (No. 28)
(March 2021)

MANA has been opening “**MANA Special Seminar**”
regularly
to promote collaboration between researchers of **MANA**

Brochure of the 464th **MANA Special Seminar** as an example (April 10, 2015)

The 464th MANA Special Seminar

ACCOMPLISHMENT REPORTS (1)

Projects of Theory-Experiment Fusion Research Fund
Chair: Dr. Masaharu Aono (MANA Director-General)

10:30 Dr. Kazuhito Tsukagoshi (MANA Principal Investigator)
Real Fusion for atomic-film electronics with designed electric state

11:00 Dr. Jinhua Ye (MANA Principal Investigator)
Construction of Artificial Photosynthetic System by Nano-architectonics of Photocatalytic Materials and Nano Metals

11:30 Dr. Naoki Fukata (Group Leader)
Synthesis of functionalized semiconducting nanowires and material design using large scale DFT calculations for the realization of next-generation vertical type transistors

Venue: Auditorium, 1F, WPI-MANA Bldg.
Date: April 10th, Friday **Time:** 10:30-12:00

Contact: International Center for Materials Nanoarchitectonics (MANA), mana_scm@nims.go.jp

The 464th MANA Special Seminar

ACCOMPLISHMENT REPORTS (2)

Projects of Theory-Experiment Fusion Research Fund
Chair: Dr. Yoshio Bando (MANA Chief Operating Officer)

13:30 Dr. Xiao Hu (MANA Principal Investigator)
Exploration of Majorana fermions and their novel quantum functions

14:00 Dr. Jun Nakanishi (MANA Independent Scientist)
Understanding and Projection of Unique Collective Cell Behavior on Nanostructured Surfaces

Projects of Nano-Life Fusion Research Fund
Chair: Dr. Masaharu Aono (MANA Director-General)

14:30 Prof. Françoise Winnik (MANA Satellite Principal Investigator)
Non-toxic quantum dots for in-vitro and in-vivo near-IR imaging

15:00 Dr. Mitsuhiro Ebara (MANA Scientist)
Development of SRIMSS for Extending Healthy Life Expectancy

Venue: Auditorium, 1F, WPI-MANA Bldg.
Date: April 10th, Friday **Time:** 13:30-15:30

Contact: International Center for Materials Nanoarchitectonics (MANA), mana_scm@nims.go.jp

MANA has been opening “**MANA Annual Party**”
(not necessarily every year)

Poster of its 2017 version (10th Anniversary of **MANA**)

MANA  **The 10th Anniversary**

MANA Annual Party

Date: Thursday, 30th March, 2017.

Venue: Auditorium & Cafeteria, WPI-MANA Bldg.

17:00-17:30 Celebration Ceremony (Auditorium)

17:30-19:30 Annual Party (Cafeteria)

Fee: ¥ 2,000 per person (¥ 1,000 for a student)

Pre-registration is required (Before Monday, 27th March, 2017)

Contact: TEJIMA.Nobuko@nims.go.jp

Pay fee at the party place.

 <http://zekkei.com>

G7 Summit 2016 was held in Japan

In relation to the Summit,
G7 Science and Technology Ministers
had a meeting in Tsukuba Science City
and visited **MANA** (May 27, 2016).



Briefing at the entrance of **WPI-MANA** Building



Briefing Tour to
several laboratories
in **MANA**



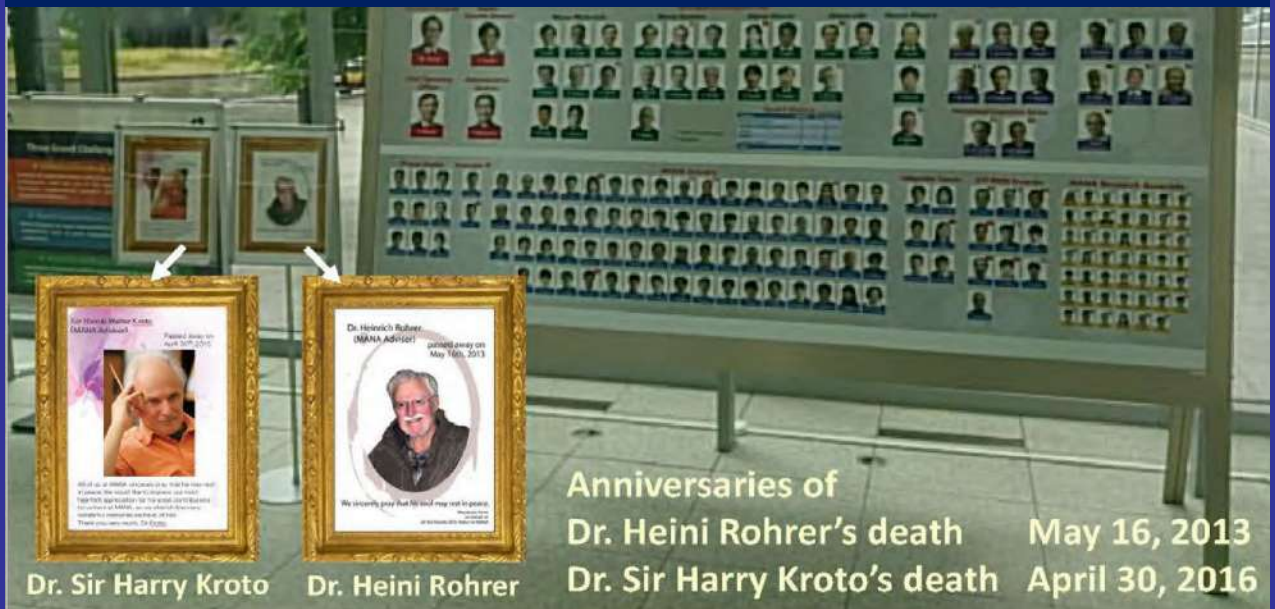
During the tour course, *almost all* ministers took a picture of this panel.

The fruits of your research are
proportional to the number of
your conversations with others.
研究成果は会話の数に比例する。

The day, May 16, 2016, when G7 Science and Technology Ministers visited our MANA/NIMS, was the third anniversary of Dr. Heini Rohrer's death in 2013. He was a great Advisor of MANA.

We were very sorry to announce, on the same day, that Dr. Sir Harry Kroto had passed away two weeks ago. He was also a great Advisor of MANA.

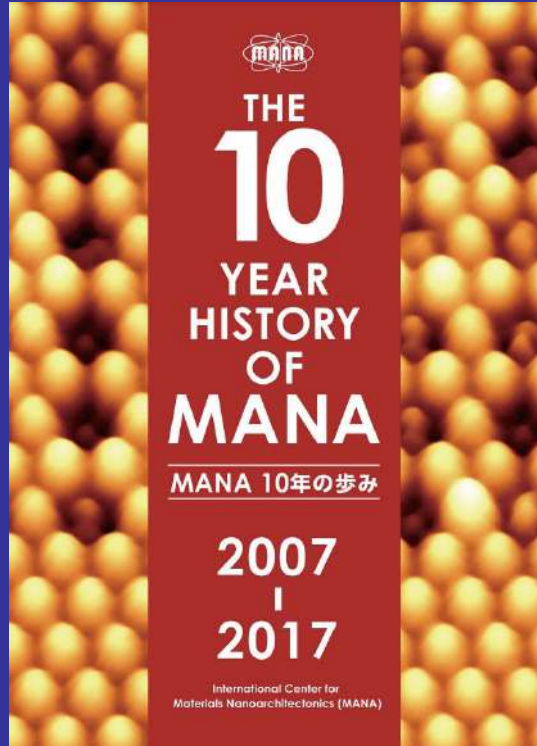
They were both lovely Nobel laureates.



Front Lobby of WPI-MANA Building

MANA 10th Anniversary

Two commemorative books were published.



Words sent to MANA's 10th anniversary (CONVERGENCE No.25)



MANA研究者の皆様、10年におかれはWPI-MANAの活動ご苦労でした。様々な研究者の、ナノテク分野での高いレベルの結果とその融合の成果、本当に“おめでとう”です。この素晴らしい果実は、各研究者と支援事務職員はもちろん、菅野拠点長 (CEO) の卓越したリーダーシップ、そして、板東運営責任者 (COO)、藤田事務部長 (GAO) そして小林事務部主任の集団運営の結果と理解しています。10年前の採用の評議委員会を思い出しています。すべて、英語での書面審査と面接。菅野拠点長とともに四苦八苦したものです。しかし、菅野拠点長が、ナノマテリアル、ナノシステム、ナノバイオ、そしてナノグリーンを前面に押し出し、一方、異分野、異文化、多国籍からなる“マルチングボット”環境の構築を推進して、採決につながりました。最後に、NIMS内の方々、国際アドバイザーの皆様、黒木先生、青瀬先生の励ましには特に敬意を表したいと思います。この活動の精神と研究システムが未だにNIMSに生き残ることを祈っています。

NIMS 名誉委員
岸 壽雄

MANA 10 周年に寄せて

この10年のMANAを振り返ってみて私にとって最も印象的なことは、それが真に国際的な研究の場を作ることになったことです。その結果多数の海外からの研究者と日本人研究者が隔てなく交流し異なる思考プロセスと文化が互いに刺激しあって新たな高いレベルの成果を出せたことです。特にインフラ言語を英語に統一したことは恐らく国内では初めての英断だと思います。プロジェクトの成功の大きな要因と想っています。今後も是非このような形態を継続し、世界のトップクラスの研究所としての永続的な評価が定まらるよう祈ります。

スタンフォード大学 工学部名誉教授、
MANA 評議委員
西 義雄



ケンブリッジ大学 教授、MANA 評議委員長
Anthony K. Cheetham

日本の画期的な施策であるWPIプログラムの一環として2007年にMANAが設立されたことをきっかけに、NIMSは従来の材料研究所から、MANAというナノサイエンスの一流センターを持つ材料研究機関へと成長しました。私はこのMANAの外部評価委員会の委員長に選ばれましたことも心より光栄に思っています。菅野拠点長、板東COOの優れたリーダーシップにより、とても円滑に議長としての任務を全うすることができました。ただ一つ悔やまれることは、文部科学省がMANAに対して定期目のプログラム更新をしなかったことです。しかし、MANAという財産は、京大地区にある拠点の建物を通してこれからも受け継がれ、NIMS全体に感銘されて行くことでしょう。



齋藤軍治 PO INTERVIEW

WPIプログラム委員会のプログラム・オフィサーとしてMANAの研究活動を推進・指導いただいた齋藤軍治先生に、これまでの十年間を振り返っていただきました。

WPIのMANA担当の Program Officer (PO)

MANA has been opening various international meetings

- **Atomic Switch: Invention, Practical Use and Future Prospects** at MANA **Mar 28, 2017**



- **2nd International Symposium on the Functionality of Organized Nanostructures**



in Tokyo
Nov 26-28, 2014

- **International Symposium on Smart Biomaterials**



at MANA
Mar 24-25
2014

- **International Workshop: Topology in the New Frontiers of Materials Science**



at MANA
Apr 1-2
2014

- **Japan-Taiwan Joint Workshop on Nanospace Materials** March 11-12, 2014

- **12th International Workshop on Beam Injection Assessment of Microstructures in Semiconductors (BIAMS 12)** June 22-26, 2014

- **5th NIMS/MANA-Waseda University International Symposium** March 24-25, 2014

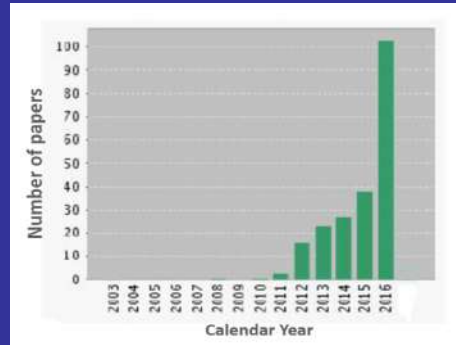
- **International Symposium on Material Architectonics for Sustainable Action (MASA 2014)** July 18, 2014

**77th Anniversary of Dr. Heini Rohrer
who supported MANA as an Advisor**



**Dr. Heini Rohrer's 77th Anniversary
at Tsukuba, Japan (2011)**

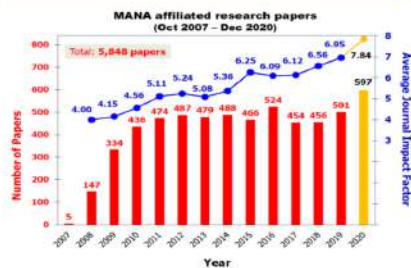
Number of papers in which the word “Nanoarchitectonics” is used in title, abstract or key words (from Web of Science).



MANA's Activities (1/2) (not necessarily most updated)

Thomson-Reuters Corp. & Elsevier Corp.

Total number of papers: **5,848**

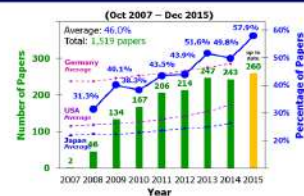


Number of top 1% papers: **106**

$$FWCI = \frac{1}{N} \sum_{i=1}^N \frac{C_i}{e_i}$$

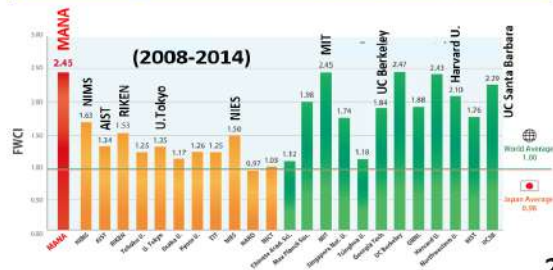
Internationally co-authored papers: **1,519**

Recently, more than 50% of MANA's papers are internationally co-authored



FWCI

Field-weighted citation impact (FWCI): **2.45**



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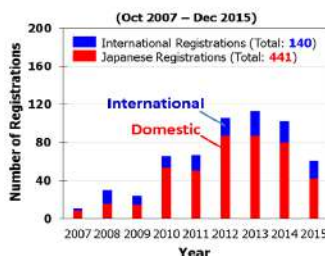
MANA's Activities (2/2) (not necessarily most updated)

External research funds: **~750 M Yen / year**

(Million Yen)

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	計
Competitive fund	24	24	128	176	265	295	359	1,271
Collaboration with private companies	403	182	364	392	260	405	398	2,404
Total	427	206	492	568	525	700	757	3,675

Number of registered patents: **581**



Lots of applications for collaboration

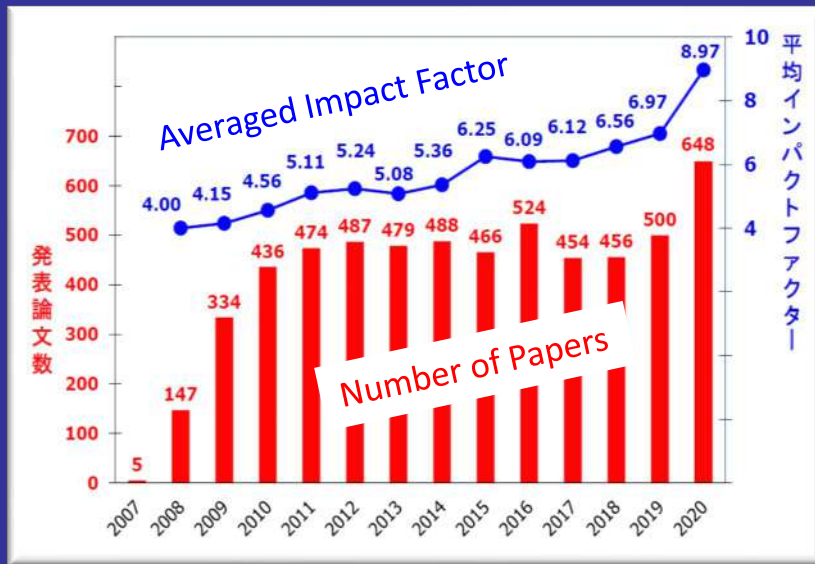
MOU

(valid MOUs, as of March 31, 2016)

- 10 Asia
- 9 Europe
- 5 North America
- 4 Australia
- 1 South America



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As of July 6, 2021

We pray for the continued prosperity of
MANA/NIMS.

Editors: M. Aono
 T. Nakayama



World Premier International
Research Center Initiative



International Center for
Materials Nanoarchitectonics



National Institute for
Materials Science

国際ナノアーキテクトニクス研究拠点
**International Center for
Materials Nanoarchitectonics (MANA)**

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