

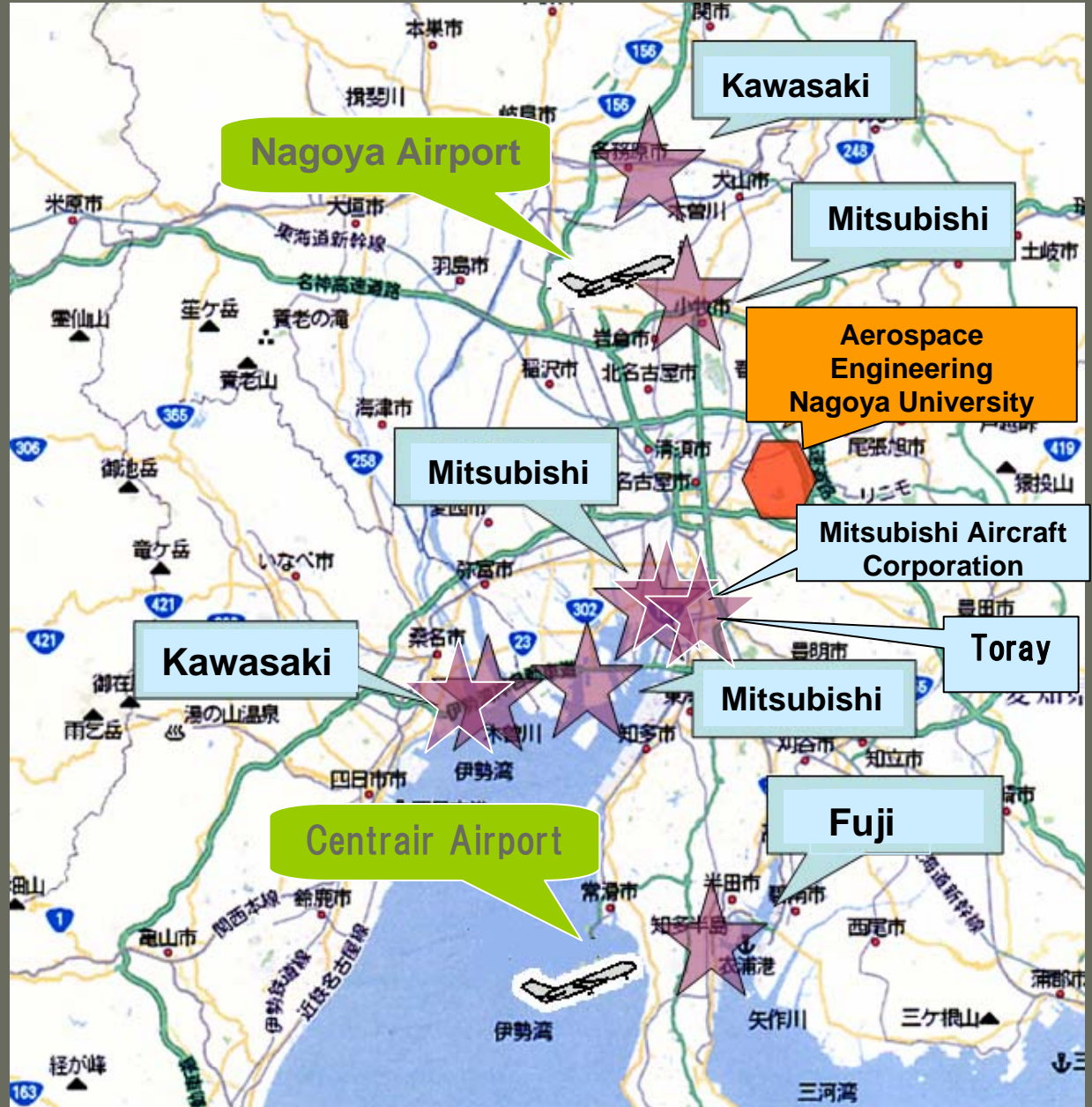
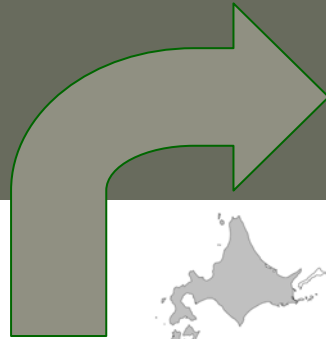
A brief introduction of

Composite Engineering Research Center

Tetsuhiko Ueda, Professor
Aerospace Engineering
Nagoya University

Cluster of Aircraft Industry in Japan

Network in Chubu Area for the development of New Aircraft



Background

Recent development of a new all-composite aircraft B787, and our MRJ having CFRP structure for its empennage

Recent attempts in the application to automobiles for saving energy with light weight structures

Recent promotion by the Ministry of Economy, Trade, and Industry (METI) and Aichi Prefecture to cluster aerospace industries in Chubu area

Aiming...

To establish a regional research center for the development of composite materials applying to the aerospace products in Chubu area.

To strengthen the educational activity on the composite materials in wider area of their applications, automobile, high-speed trains,....

Composite Engineering Research Center

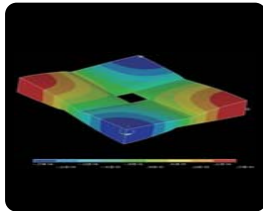
- Established in February, 2009
- As a center belonging to the Graduate School of Engineering, Nagoya University
- Including 15 faculty members and 2 visiting professors from JAXA

Composite Engineering Research Center

The Composite Engineering Research Center (CERC) is the research organization in Nagoya University to establish a community-based center of excellence for education, research, and development in the field of composite material engineering.

Strength Tests and Evaluations

Evaluation of mechanical strength and development of analytical methods



- Strength tests
- Quality and reliability evaluation
- Innovative composite materials
- Maintenance & repair

Machining Technology

Examination and improvement of processability and safety of composite materials

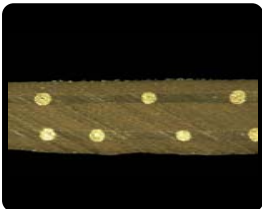


- Development of cutting techniques
- Cutting dust management
- Curing technique for warping and distortion
- Environment and safety

CERC

Electrical Characteristics

Examination and improvement of electrical characteristics for conduction and insulation



- Control of conduction or insulation characteristics
- Intelligent composite materials
- Electrical characteristics evaluation
- Simulation for electrical conductivity

Applications and Developments

Application of composite materials to various fields as aircraft, automobiles, high-speed transport ...



- Efficient mass production techniques
- Enhancement of heat resistance
- LCA and recycling
- Novel configuration for composite structure

Planning
Committee

Aerospace Design
Engineering Laboratory
Graduate School of
Engineering



**Nagoya Univ – JAXA
Cooperation Agreement**

Japan
Aerospace
Exploration
Agency

Planning
Committee

Nagoya University

**Domestic and
International
Research
Organizations**

**Composites
Related
Companies**



Development of Mitsubishi Regional Jet

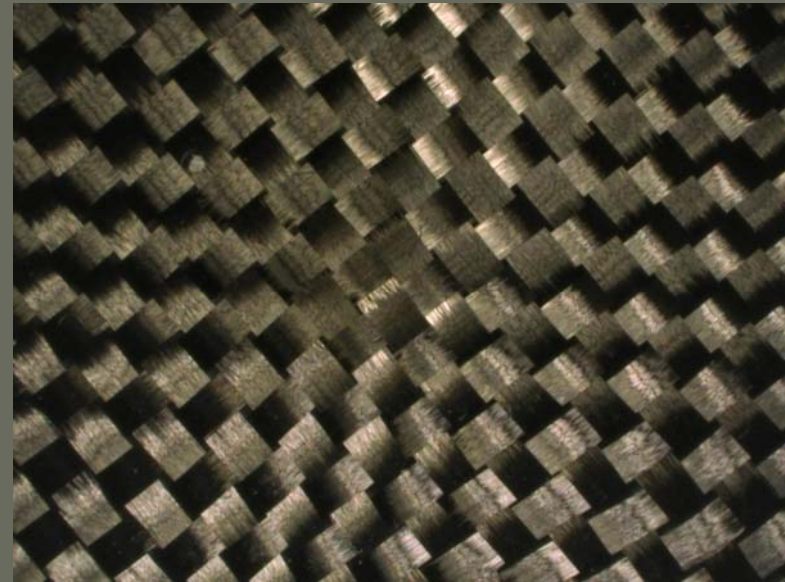
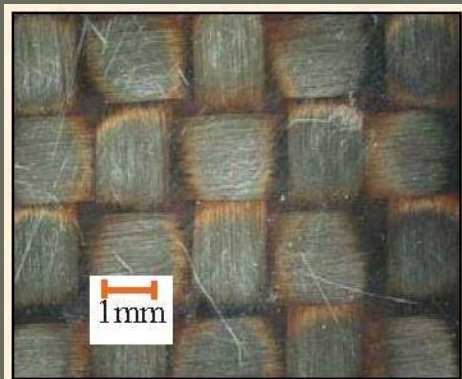
Mitsubishi
Heavy
Industries,
LTD

Regional Industries in Chubu Area

Aerospace Industry Forum

Research Subjects on CFRP

- Strength Evaluation
- Design Technology
- Shaping and Machining Technology
- Quality Assurance and Reliability
- Maintenance and Repair



Applied Chemistry, Chemical Engineering and Biotechnology

Applied Chemistry

Chemical Engineering

Biotechnology

Materials, Physics and Energy Engineering

Materials Science and Engineering

Applied Physics

Quantum Science and Energy Engineering

Electrical Engineering and Computer Science

Electrical Engineering

Electronics

Communications and Computer Science

Mechanical Science and Engineering

Mechanical Engineering Science

Mechano-Informatics and Systems

Mechatronics

Aerospace Engineering

Aerospace Engineering

Civil Engineering

Civil Engineering

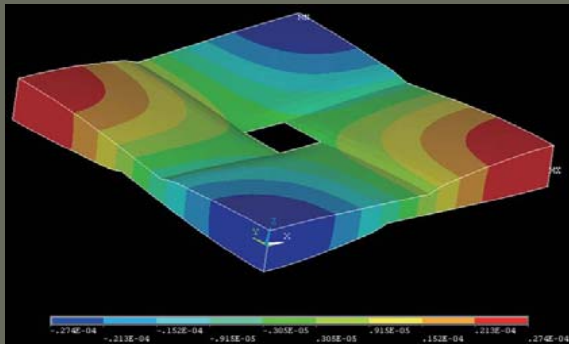
CERC Members

4 Groups in CERC

- Strength Tests and Evaluations
- Machining Technology
- Electrical Characteristics
- Applications and Developments

Strength Tests and Evaluations

Evaluation of mechanical strength and development of analytical methods



- Strength tests
- Quality and reliability evaluation
- Innovative composite materials
- Maintenance & repair

Machining Technology

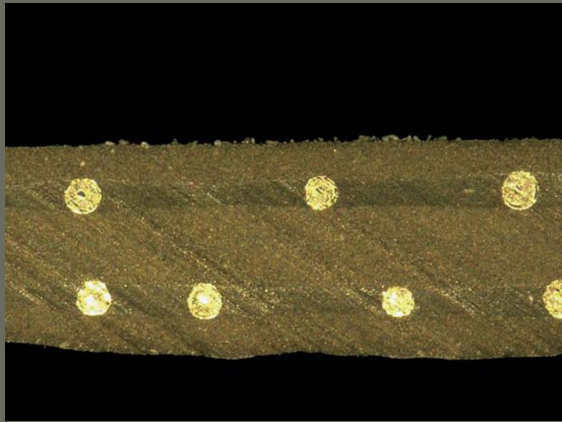
Examination and improvement of processability and safety of composite materials



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Electrical Characteristics

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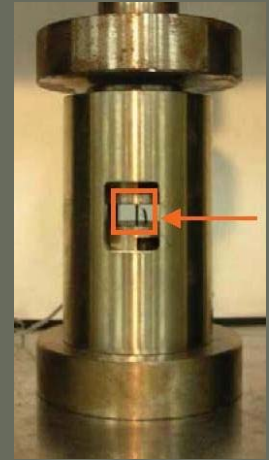
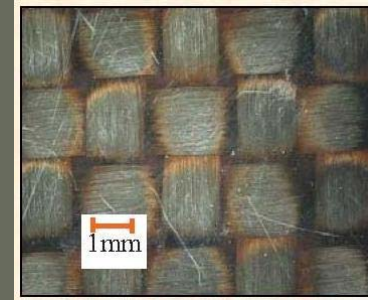
Applications and Developments

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- LCA and recycling
- Novel configuration for composite structure

Related Subjects



Aerospace Engineering

Structures and Control

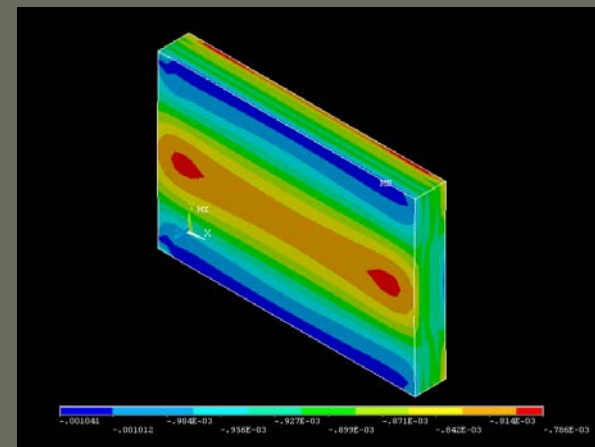
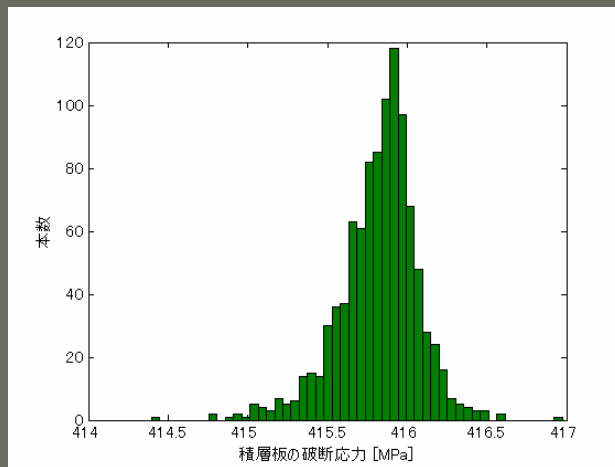
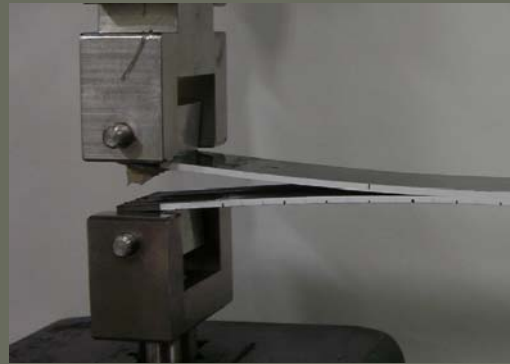
Composite structures, Intelligent material, and Smart structures

Fluid Dynamics and Propulsion

Computational Fluid Dynamics,
Interdisciplinary analysis



Fundamental Testing and Analysis



Applied Chemistry

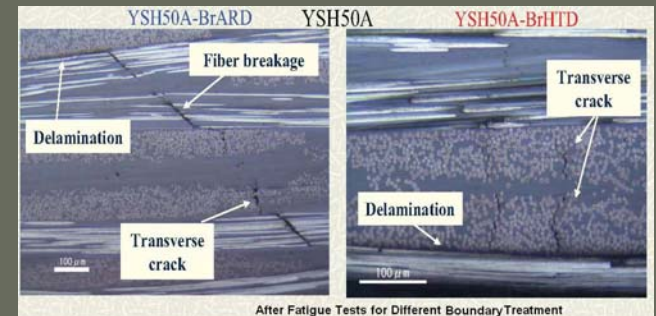
Analytical Chemistry

Exploitation of Multi-functional Separation systems for Material Diagnosis and Chemical Speciation Analysis

Chemical Engineering

Chemical Systems Engineering

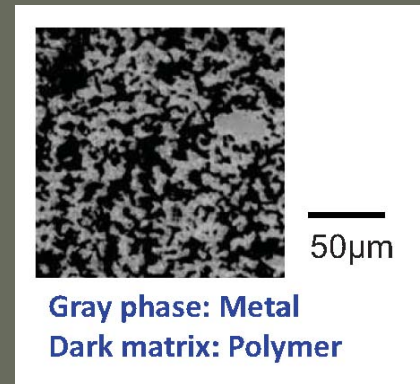
Environmental Technology, Fluidization Engineering, Porous Material Technology



Materials Science and Engineering

Division of Materials Characterization

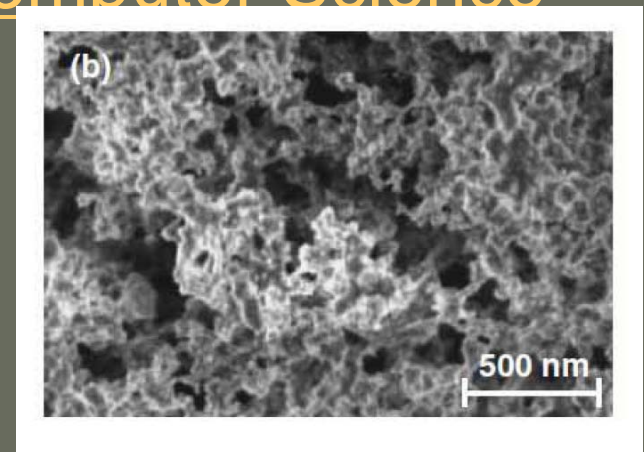
Materials Structure Characterization

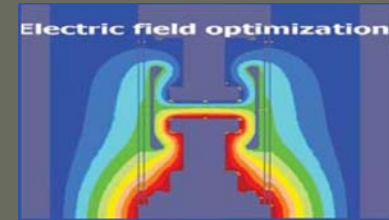


Electrical Engineering and Computer Science

Electrical Engineering

Plasma-Nano Process





Power Engineering and Systems

Energy System and Environment

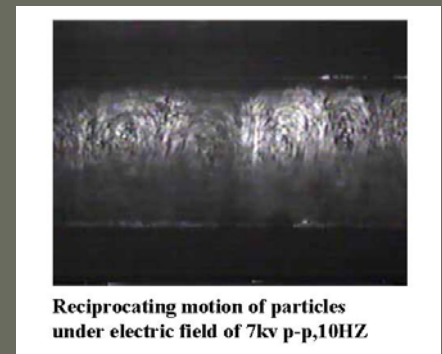
Improvement of performance and reliability of power apparatus and their materials for environmentally friendly energy system

Mechanical Science & Engineering

Manufacturing Process Technology

Tribology

And others



Collaborations

- Japan Aerospace Exploration Agency
- Mitsubishi Heavy Industries, LTD.
- Toray
- ...

New Facilities – Composites Research System

- Composites Strength Test System
- Ultrasonic Flaw Detect System
- Composites Processing System
- Composites Cutting Machine
- Dynamic Property Analysis Instrument
- Analyzing System for Machining of Composite Materials
- Surface Processing and Analyzing Device of Composite Materials Using Atmospheric Pressure Plasma
- Highly-Repetitive Pulse Laser
- Evaluation System of Electric Characteristics of Composite Materials
- Thermal Analysis System
- Thermal Conductive and Radiative Properties Evaluation System

