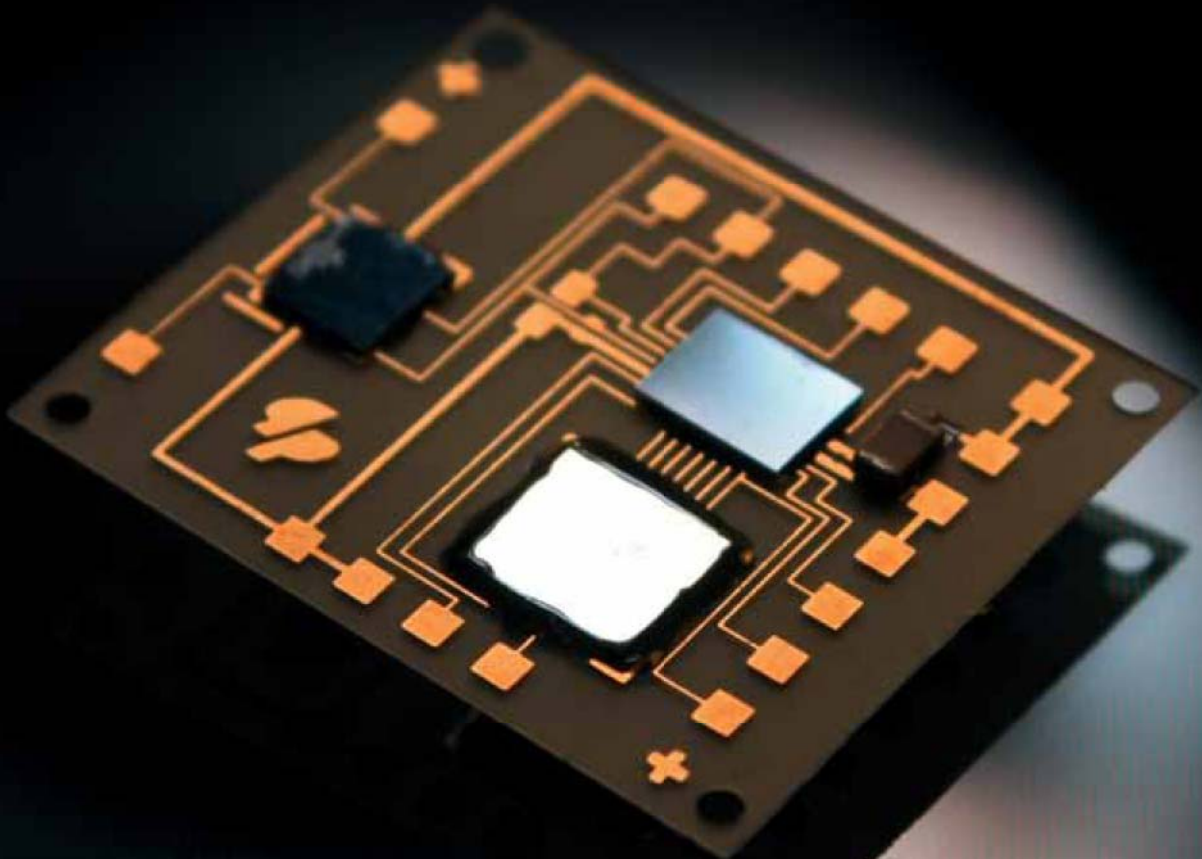




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FRAUNHOFER RESEARCH INSTITUTION FOR ELECTRONIC NANO SYSTEMS ENAS



Annual Report

2008

FRAUNHOFER ENAS



FRAUNHOFER ENAS AND THE WORLD PREMIER INTERNATIONAL RESEARCH CENTER

Advanced Institute of Materials Research (WPI-AIMR) at the Tohoku University in Sendai

In the year 2007 the Japanese Ministry of Education, Culture, Sports, Science and Technology, MEXT, established the program "World Premier International Research Center (WPI) Initiative." The WPI Program, as it is called for short, provides concentrated support for projects to establish and operate research centers that have at their core a group of very high-level investigators. These centers are to create a research environment of a sufficiently high standard to give them a highly visible presence within the global scientific community—that is to create a vibrant environment that will be of strong incentive to frontline researchers around the world to want to come and work at these centers. Four of such research centers have been created. One of them is the Advanced Institute of Materials Research (WPI-AIMR) at the Tohoku University in Sendai headed by Prof. Yamamoto. WPI-AIMR has adopted a unique method of appointing the world's leading researchers as research leaders, or what is termed Principle Investigators (PI). Currently there are 29 PIs. Although most of them belong exclusively to WPI-AIMR, two of them also belong to other domestic institutions and 10 of them are located at research centers outside Japan. PIs possess comprehensive authority over their research and are allowed to make proposals to the Center Director on hiring new researchers necessary to carry out their research. Prof. Thomas Gessner, Director of Fraunhofer ENAS, has been selected as one of PIs.

WPI-AIMR consists of four research groups. The four research groups, or Thrusts, implement joint projects and aim at creating breakthrough research through fusion research. Although it is important, as a matter of course, for them to deepen their studies in each specific area or research field to produce cutting-edge results, discoveries of totally new phenomena

and the creation of completely original ideas is more often generated from the fusion between different fields. It is thought that cluster structure exists through glue and interface science and atomic and molecular manipulation are the fundamental academia, which are developed into useful materials by MEMS and NEMS for example.

Since November 2008 the research group of Prof. Thomas Gessner at the Tohoku University takes shape. At that time Dr. Yu-Ching Lin has been employed as Assistant Professor to start the actual research work. Prof. Lin has been working at the Tohoku University before to obtain her PhD degree in the field of engineering.

Just before moving to the WPI-AIMR she was working in Germany at the Fraunhofer ENAS for almost a year. Because of that it is expected that she can form a strong relation between the topics researched in Chemnitz and her future work in Sendai within a close cooperation. Her field of work at the time in Fraunhofer ENAS was to investigate bonding technologies for the packaging of MEMS devices, especially the gold-silicon eutectic bonding. In the research group at the Tohoku University this work should be continued, but with focus on new nano structured materials and integration technologies that can not be used at the Fraunhofer ENAS because of the contamination sensitive near production equipment environment. Since the main focus of the WPI-AIMR is the development and investigation of new materials with world class physicist and chemists it is expected that collaboration within the institute will stimulate the research work inside the group of Prof. Gessner. Already now a strong cooperation between the Gessner Lab and the Esashi Lab, both working in the field of MEMS/

NEMS devices takes place. So the members of Gessner Lab are working in the same facilities as staff of Prof. Esashi. As a starting point multilayered nano scale materials that exhibit a self propagating exothermic reaction behavior for the purpose of very localized heating for semiconductor bonding with low thermal budget will be researched. Especially the creation of new kind of 3D-interlayer structures is of interest.

It is planned to increase the size of the research group of Prof. Gessner next year by hiring additional post doctors that will work in Sendai under the guidance of Prof. Lin to broaden and deepen the research work.

PROTOTYPE



SENDAI, JAPAN

WAFER LEVEL



CHEMNITZ, GERMANY