

## Returnee's Report

Name	Yuhei Inata
Department	Frontier materials, Environmental Ceramic materials
Grade	Master 1
NITECH Advisor	Prof. Dr. Yuji Iwamoto
Exchange University	Technische Universität Darmstadt
Exchange University Advisor	Prof. Dr. Ralf Riedel
Country, City	Germany, Darmstadt
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### **Program Report**

#### <Program Contents>

Research Topic: Synthesis and Evaluation of Rare Earth Cation-Doped Polymer-Derived SiOC-Based Ceramic Nanocomposites.

Polymer-derived ceramics have been studied for many kinds of materials systems. One of them, the polymer-derived silicon oxycarbide-based materials (SiOC) have been investigated for high temperature resistant ceramic materials. Incorporation of additional elements into the Si-O-C system has been shown to improve the properties of high temperature resistance such as thermal stability and the crystallization resistance. Furthermore, doping rare earth (RE) elements to SiOC matrix can be expected to provide the additional properties such as optical, electrical, and magnetic properties. In this research work, RE-doped SiOC ceramic materials were synthesized from the polymer-precursors and analyzed the effect of the dopant RE element.

#### <Achievements/Ambitions>

RE doped SiOC ceramic materials was successfully synthesized by the polymer-precursor method. The ceramic materials were analyzed by X-ray diffraction (XRD), scanning electron microscope (SEM), elemental analysis, and the mass loss. Furthermore, the magnetic properties were analyzed by superconducting quantum interference device (SQUID) to study the effect of doping RE element. The results indicate that dopant RE element could enhance the high temperature stability of the SiOC ceramic materials and bring unique magnetic properties.

This is precious experience for me. I would like to apply this experience to my future works. Additionally, I will pass on this experience to my colleagues and it will have a good effect on my colleagues of ICRE.

Finally, I would like to express my sincere gratitude to Prof. Dr. Ralf Riedel and Dr. Emanuel

Ionesce and other Riedel's research group members for their kind help to my research works at TU-Darmstadt.



Fig. 1 The picture taken with Dr. Mirabbos Hojamberdiev.



Fig. 2 The precursor of my sample



Fig. 3 I had a great time with group members.