

INTERNATIONAL SEMINAR

# Recent Development in Traditional Porcelain

Sponsored by Ceramic Research Center of Saga University

Date and Time: 2021. 07. 30 (Fri) 16:00–17:30

Place: Webex online

Contact: Dr. Dong HAO

[h-center@mail.admin.saga-u.ac.jp](mailto:h-center@mail.admin.saga-u.ac.jp)

This event is open to: Everyone. [For registration, visit our website.](#)

Program:

16:00–16:05 Opening Remark

by Prof. Mitsunori Yada (Director of Ceramic Research Center of Saga University)

16:05–16:45 The relation between phase composition and strength of porcelain using the Rietveld method

by Dr. Jaegyeom Kim (Korean Institute of Ceramic Engineering and Technology)

16:45–17:25 Science of traditional porcelain making in Jingdezhen

by Prof. Junming Wu (Jingdezhen Ceramic University)

17:25–17:30 Closing Remark

by Dr. Dong Hao (Ceramic Research Center of Saga University)

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# CERAMIC RESEARCH CENTER of SAGA UNIVERSITY

## *International Seminar* *Recent Development* *in Traditional Porcelain*

16:00-16:05 Opening Remark

by Prof. Mitsunori Yada (Director of Ceramic  
Research Center of Saga University)

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SEMINAR

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by Dr. Jaegyeom Kim (Korean Institute of  
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Jingdezhen**

by Prof. Junming Wu (Jingdezhen Ceramic  
University)



17:25-17:30 Closing Remark

by Dr. Dong Hao (Ceramic Research Center of  
Saga University)

**Friday**  
**July 30<sup>th</sup>, 2021, 16:00~, Webex**

Registration: Please scan the QR code or send your information to us by mail.



Organized by Ceramic Research Center of Saga University

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Registration



# The relation between phase composition and strength of porcelain using the Rietveld method

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**Keywords:** Porcelain, High strength, Rietveld method, Quantitative phase analysis

Powder X-ray diffraction is the best available technique for the identification and quantification of crystalline mixture materials. Since H. Rietveld developed a whole pattern fitting structure refinement based on the powder X-ray diffraction data in 1969, the refinement procedure is called “Rietveld refinement”. The Rietveld refinement method is currently the most useful tool to obtain direct quantitative phase analysis of complex materials. Inherent advantages of this method have increased its application to nearly all classes of crystalline materials. The Rietveld method is also useful to indirectly determine the amorphous content by adding a suitable crystalline standard. Typical porcelain bodies are made from materials collected from selected deposits using different mixing proportions of clay, feldspar and quartz, which are heat-treated to form a mixture of glass and crystalline phases. The phase proportion is very important factor to affect the physical properties of porcelains. Thus, phase determination and quantification are of special importance in the study of porcelain materials. In this work, alumina, mullite, and cordierite powder were added to a whiteware porcelain slurry and fired at 1280 °C to investigate the correlation between porcelain composition and strength. A Rietveld quantitative analysis indicated that the amorphous phase decreased with increasing additional alumina and mullite content, while the amorphous content remained constant regardless of the additional cordierite content. The decrease in the amorphous content increased the strength of the porcelain, which, in the case of the sample with 15 wt.% alumina, increased by 57%. The dramatic increase in strength is attributed to the increase in residual stress due to the difference in the thermal expansion coefficient between the alumina and the amorphous phase, as well as the increased formation of mullite by the addition of alumina.

## Biography



Jaegyeom Kim received the Ph.D. degree in applied chemistry from the Ajou University in 2019. He is currently a Postdoctoral Researcher at Icheon Branch of Korean Institute of Ceramic Engineering and Technology (KICET). His research interests include energy storage materials, thermal conductive materials and porcelain. He has published papers related to crystal structure analysis. His research method combines crystal structure and material properties (physical, electrical, chemical, etc). His research aims to design crystal structures that exhibit desired properties.

# Science of traditional porcelain making in Jingdezhen

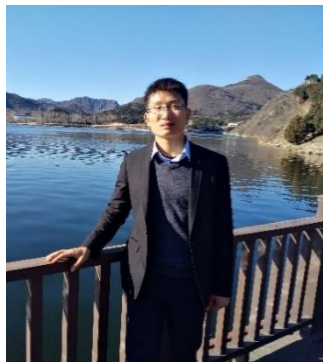
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Jingdezhen, the centuries-old porcelain capital, not only has a long history of porcelain making, aboveground and underground historical relics are rich, but also created a lot of excellent porcelain making skills, and it has been preserved and used to this day. These excellent traditional porcelain making skills are a group of precious and important historical and cultural heritage. At the same time, it also contains rich scientific content, which is worth studying and revealing. Both in raw material preparation, raw material processing or molding process firing process and other aspects, Jingdezhen still retains a lot of traditional skills. So what sustains it for so long? What are the scientific implications? What is the influence to the formation of porcelain capital status? (The scientific nature of lime ash preparation is introduced emphatically, Scientific nature of water-borne porcelain stone raw materials, the scientific nature of Zhenyao (firewood kiln invented by Jingdezhen)).

## Biography



Junming Wu, PH.D., Professor, Master Supervisor, Leader of Jiangxi Intangible Cultural Heritage Research Base, Leader of popular science education base in Jiangxi province, Director of Jingdezhen Science Popularization Education Base, Young Jing gang Scholar of Jiangxi Province, reviewer expert of Journal *Analytical Methods* of the Royal Society of Chemistry, review expert of National Natural Science Foundation of China project, Member of the First Council of Ceramic Intangible Cultural Heritage Inheritance Science and Technology Alliance. He is mainly engaged in the research and teaching of ceramic technology history, ceramic archaeology, cultural heritage and ceramic cultural creative industry, Especially in Jingdezhen ceramic intangible cultural heritage scientific connotation exploration, a great deal of research work has been carried out on inheritance, protection, development and utilization, and has made some stage research results, which includes the scientific principle of Jingdezhen traditional lime ash preparation technology and the process simulation of the preparation technology of ancient famous porcelain, and so on.