

Title : Investigation of the structure and composition of crystallized substances in the SIAMITE synthesis process to replicate gemstones.

Author(s) :

1. Thanaporn Seesatharn
- 2.
- 3.

Student ID : 650510463
Student ID :
Student ID :

Major : Gemology

Advisor(s) :

1. Dr. Ratthaphon Amphon
- 2.
- 3.

Type of presentation* (choose 1) :

Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)

Poster (กรณี นำเสนอผลงานปัญหาพิเศษ/การค้นคว้าอิสระ)

Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

Currently, various minerals or synthetic materials are used to replace or imitate gemstones, such as SIAMITE made from glass ceramic ($\text{SiO}_2\text{-Al}_2\text{O}_3\text{-MgO}$), which is an amorphous substance with a disordered structure that forms nanometer-sized crystals. It has transparent and beautiful colors, but may have minor inclusions commonly found in glass. However, in some pieces, white crystals appear within the product, causing significant damage during the manufacturing and sales processes. Therefore, this study aims to investigate the structure and chemical composition of the white crystals that form during the synthesis of SIAMITE and to find ways to improve production and prevent damage caused by the manufacturing process. By studying all 5 samples of SIAMITE, which have different colours and similar material characteristics, using basic instrument with a gemological microscope and advanced instrument with a Scanning Electron Microscope (SEM), X-ray fluorescence spectrometer (XRF), and Raman spectroscopy. From the study results, it was found that this crystal has a acicular structure grouped in a radial and

*Type of presentation must be matched with an option you choosing on student upload system.

**The abstract can be more than one page and must be approved by project advisor before upload.

dendritic pattern, colorless to white opaque. The crystal has hexagonal and square cross-sections, and the crystallization area contains oxygen (O) (~34%), aluminum (Al), and zinc (Zn) in similar amounts (~20%). Trace elements such as silica (Si) in the amount of 8%, sodium (Na), magnesium (Mg), and titanium (Ti) in the amount of 2% were also found. This differs from the analysis results using XRF technique, which showed Al_2O_3 (~21%) in higher amounts than SiO_2 (~62%), but ZnO only 7%. Trace element oxides such as TiO_2 and ZrO were found in amounts of 3%, but Na_2O and MgO oxides were not detected. The study results allow for the hypothesis that this crystal may be two types of minerals: mullite ($3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$) and willemite (Zn_2SiO_4), which have similar crystal shapes and chemical compositions to the formed crystal. However, Raman spectroscopy analysis found that the white crystals are different in all aspects, making it unclear what type of substance this crystal is and how its production can be improved. Consequently, further studies should be conducted to examine the crystal structure.

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*

Title name guide.

ADVISOR title name / แปลไทย	
Professor Dr.	ศาสตราจารย์ ดร.
Professor	ศาสตราจารย์
Associate Professor Dr.	รองศาสตราจารย์ ดร.
Associate Professor	รองศาสตราจารย์
Assistant Professor Dr.	ผู้ช่วยศาสตราจารย์ ดร.
Assistant Professor	ผู้ช่วยศาสตราจารย์
Dr.	ดร.
Lecturer	อาจารย์
Mrs.	นาง
Ms.	นางสาว
Mr.	นาย

Major name guide.

SCIENCE MAJOR name / แปล	
Biology	ชีววิทยา
Microbiology	จุลชีววิทยา
Zoology	สัตววิทยา
Biochemistry and Biochemical Technology or Biochemistry and Biochemical Innovation	ชีวเคมีและชีวเคมีเทคโนโลยี หรือ ชีวเคมีและชีวเคมีนวัตกรรม
Chemistry	เคมี
Industrial Chemistry	เคมีอุตสาหกรรม
Materials Science	วัสดุศาสตร์
Physics	ฟิสิกส์
Computer Science	วิทยาการคอมพิวเตอร์
Data Science	วิทยาการข้อมูล
Mathematics	คณิตศาสตร์
Statistics	สถิติ

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*

Gemology	อัญมณีวิทยา
Geology	ธรณีวิทยา
Environmental Science	วิทยาศาสตร์สิ่งแวดล้อม

**Type of presentation must be matched with an option you choosing on student upload system.*

***The abstract can be more than one page and must be approved by project advisor before upload.*