

## Preparation of Different Dispersions Formulation For Consolidation Of Jordanian Basaltic Artifacts

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### Introduction

Basalt is an extrusive igneous rock, formed deep under the earth crust during volcanic eruptions, through primary or secondary origins. Basalt mostly contain silica (45-52%), calcic plagioclase ( $\text{CaAl}_2\text{Si}_2\text{O}_8$ ), clinopyroxene ( $\text{Ca, Mg, Fe (Si}_2\text{O}_6)$ ) and olivine ( $\text{Mg, Fe}_2\text{SiO}_4$ ). A specific example of an environmental problem faced is chemical weathering as a result of dissolution process of the constituent silicate minerals causing unwanted discoloration of the ferromagnesian minerals. Weathering of basalt produces an amount of insoluble material as a result of chemical processes. This variation produces cracks and causes weakness and discoloration of basalt. The desire to preserve basalt artifact created a wide variety of products to reduce the rate of basalt stone artifact decay and to strengthen decayed stone. Consolidants are widely used in restoration and conservation intervention as a mean of imparting the structural strength of a stone, which has been deteriorating and disintegrating.

### Aim:

The aim of this study is to investigate a new methodology to consolidate basalt artifact.

### Methodology:

- 1) Preparation a set of calcium hydroxide/ isopropyl alcohol dispersion formulation of consolidant
- 2) Modifying the consolidant by mixing dispersion solutions with tetraethylorthosilicate or tetramethylorthosilicate polymer using surfactant
- 3) Testing the efficiency of prepared dispersion on the basalt artifact
- 4) Predicting the future effects through thermal and mechanical techniques.

### Obtaining suitable consolidant certain specifications must be considered:

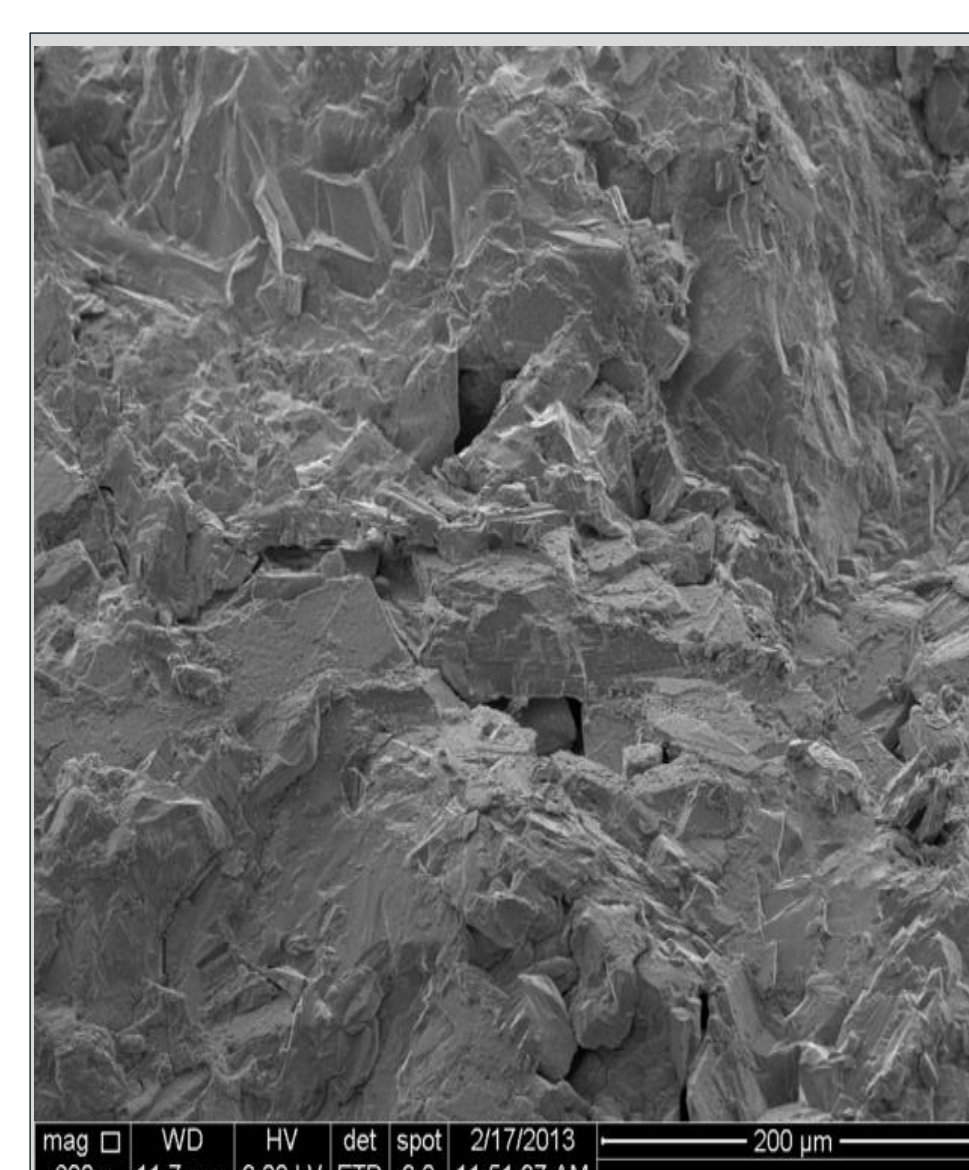
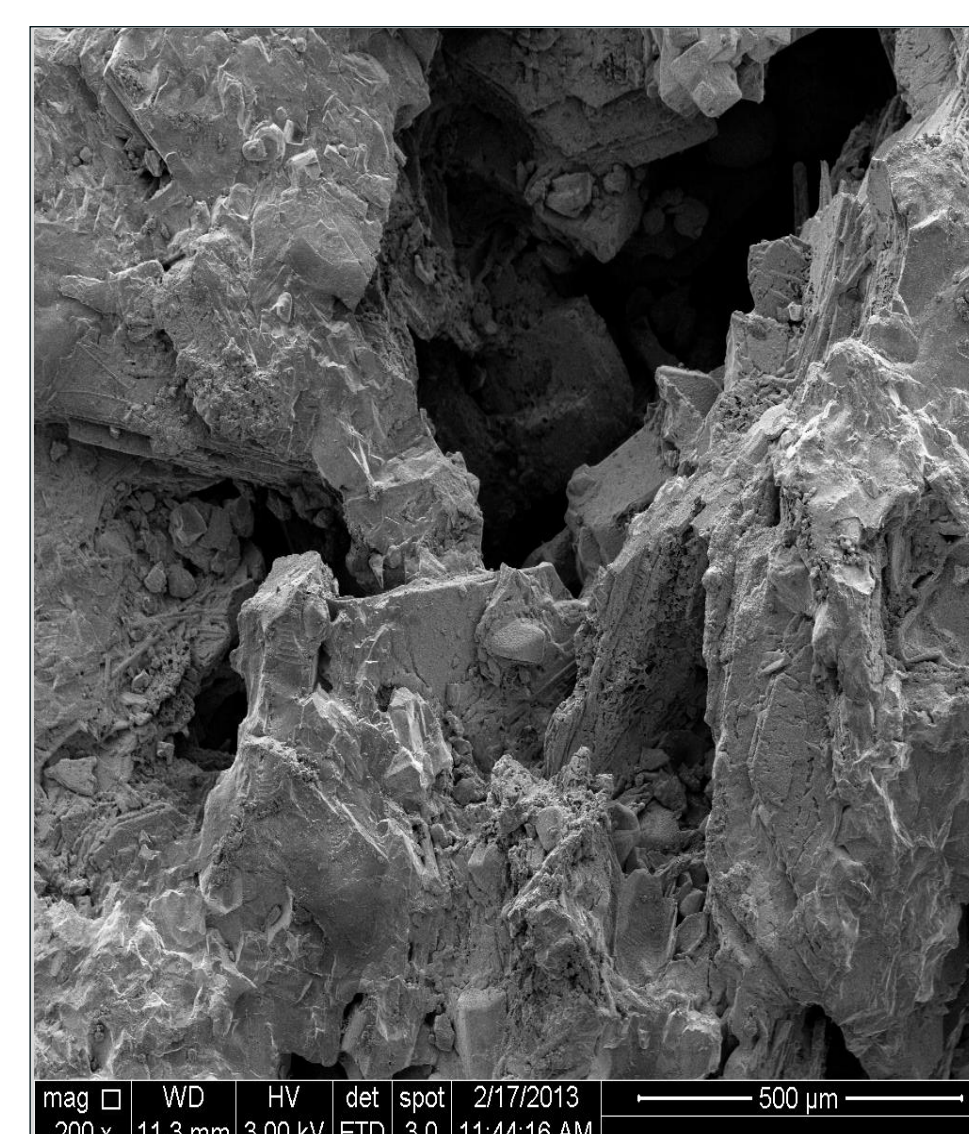
- 1) It must have the ability to penetrate the artifact, and this requires low viscosity and contact angle with the artifact.
- 2) A consolidant should be dissolved in the used solvent.
- 3) It should be low viscosity system which undergoes a chemical reaction in situ to give a solid product.

### Techniques used to test the basalt artifact:

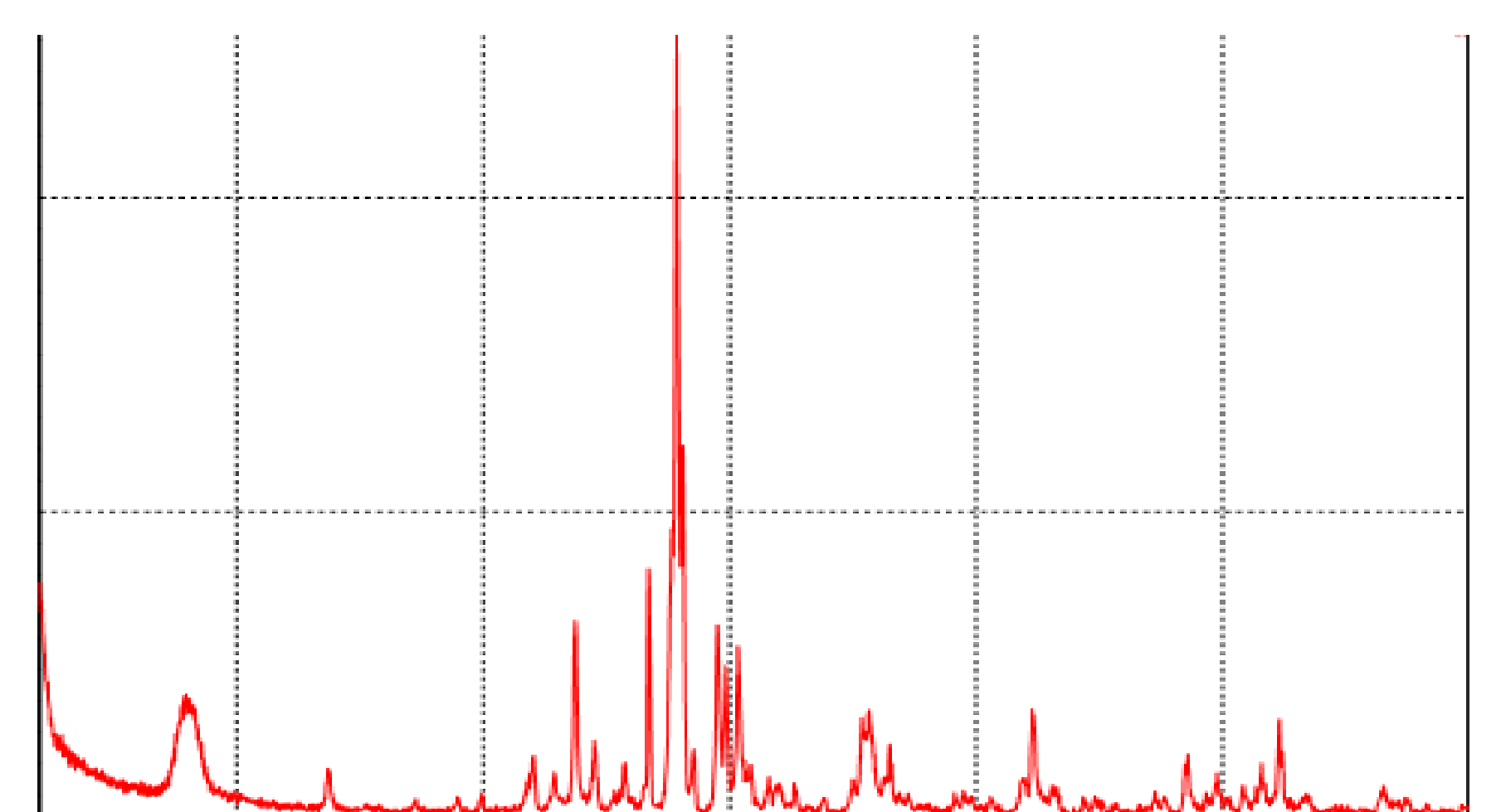
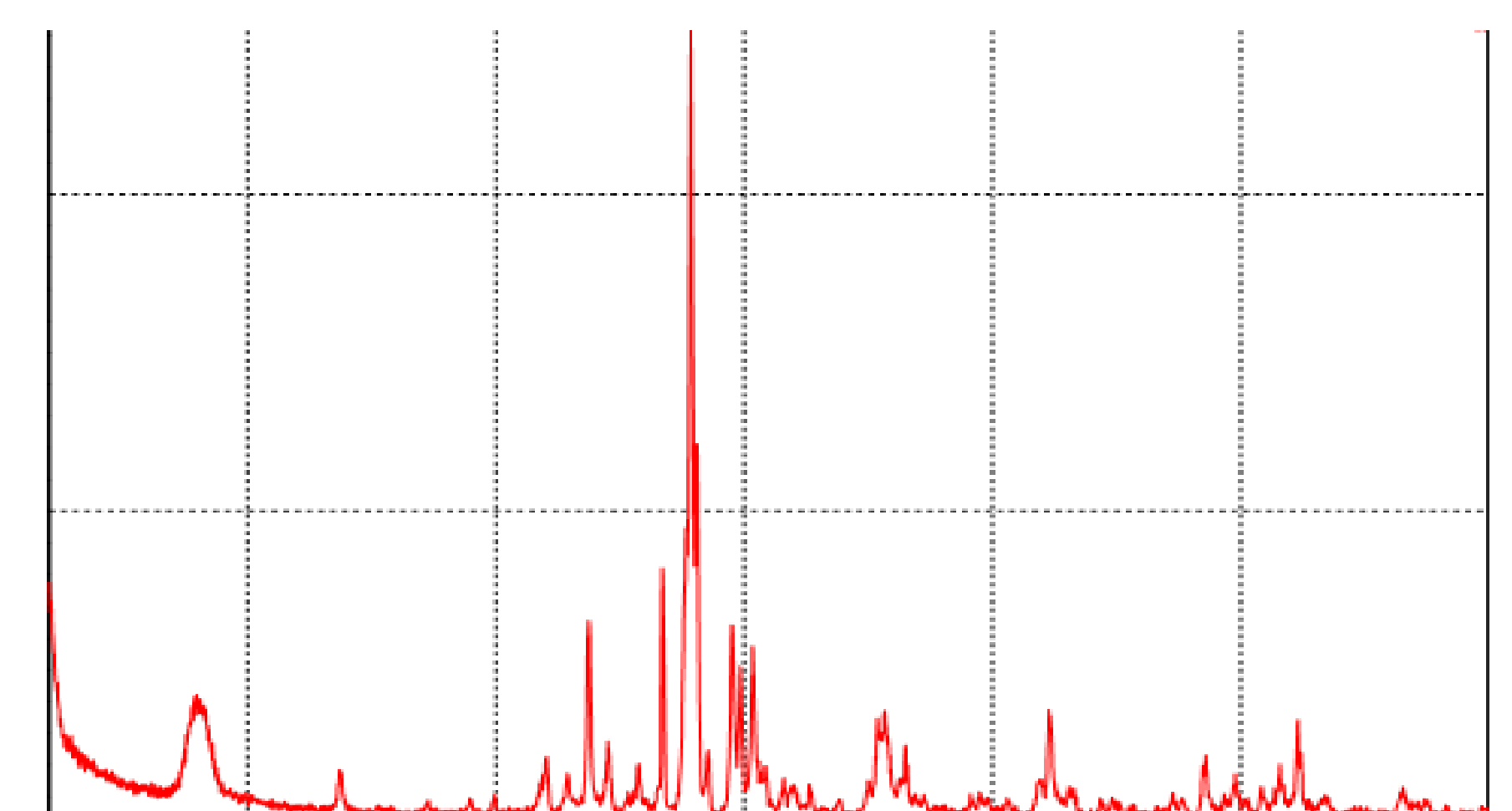
- 1) Scanning Electron Microscope (SEM)
- 2) X-ray Diffraction
- 3) Polarizing Microscope



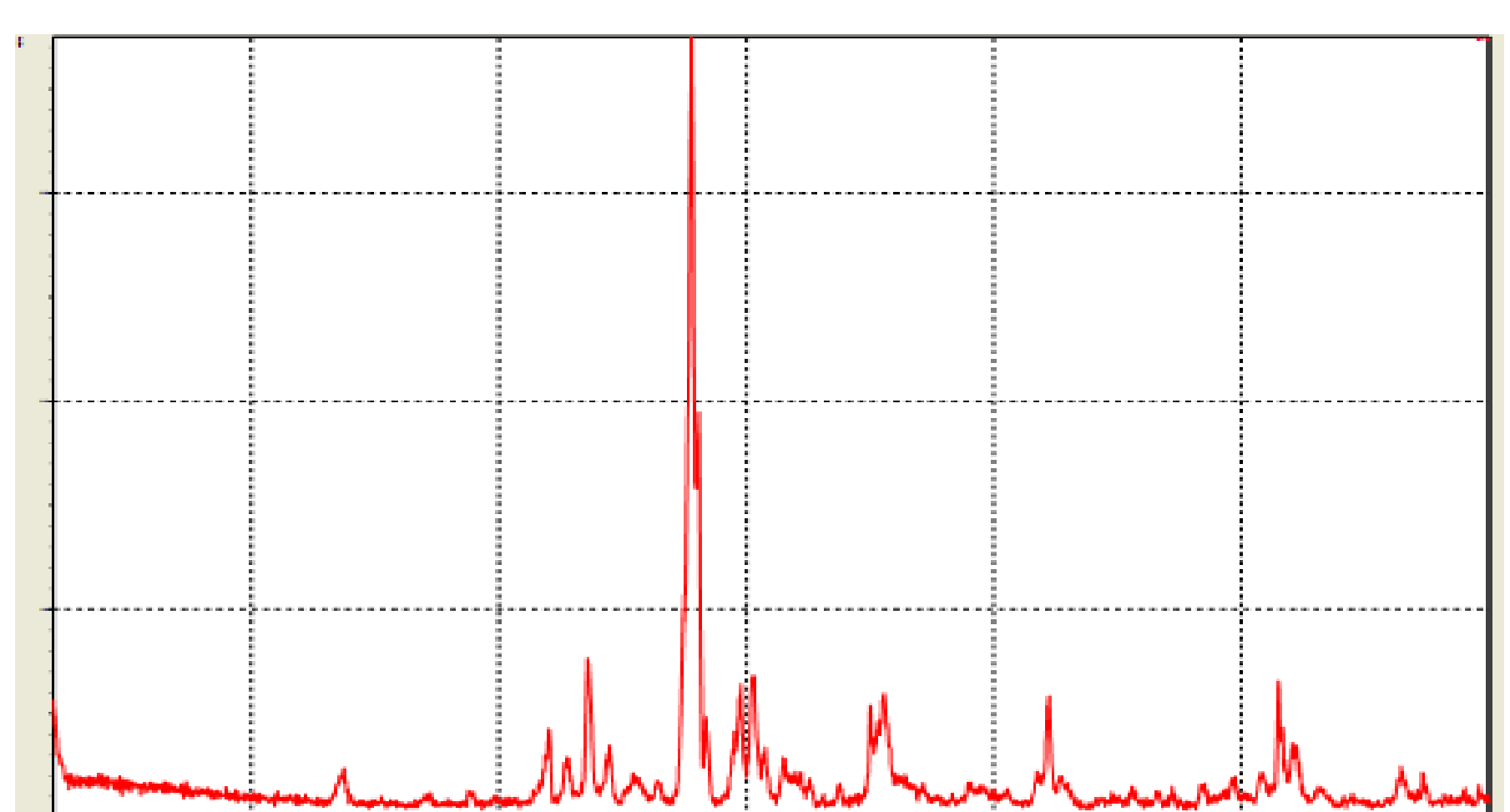
Basaltic artefacts which were from the period of 4<sup>th</sup> – 7<sup>th</sup> century A.D  
Byzantine period



Basalt artifact under SEM



Basalt artifact under XRD before treatment



Basalt artifact under XRD after treatment shows that the stone have the same properties of the original stone.