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ABSTRACTS

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A PETROGRAPHIC STUDY ON ANCIENT MORTAR FROM WAHALKADA ANICUT, YAN OYA, SRI LANKA

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A petrographic study was conducted on the ancient cement from Wahalkada anicut, which had been built across Yan Oya on Anuradhapura-Trincomalee border. Thin sections studies revealed that the majority of samples consist quartz and garnet as clastic grains in a fine-grained lime cement, while feldspar and pyroxene minerals can be observed as a minor phase. Rice husk, which were added to the mortar, have also been observed. Under the microscope, mineral grains embedded in a fine-grained matrix that developed as a result of reactions between the components present in the cement were observed. Secondary crystallization of a Ca-rich matrix can be observed around almost all the grains, including rice husk and along the fractures. Rice husk fragments are often split into flakes, and recrystallization has occurred within these flakes. Some of the original mineral grains have been fully replaced by secondary matrix, which could most probably be alite (tricalcium silicate). When alite comes into contact with water, they are hydrated to form weakly crystalline $3CaO{\cdot}2SiO_2{\cdot}4H_2O$ (calcium silicate hydrate –CSH) and $Ca(OH)_2$ (portlandite). CSH bonds the alite particles together, expanding into the interstices, generating an interlocking mass. Portlandite crystals have grown around, as well as into the fractures of the detrital grains, as a result of the cementation process. Under the microscope, rice husk exhibits higher degree of cementation compared to that of the other components in the sample. The reason could be that the rice husk, an organic matter enriched with silica, could release silica faster and in a short time period, when undergoes decomposition. Use of rice husk has given a distinct advantage in strengthening the cement due to their pozzolanic activity, durability, and strength and this must be one of the major reasons for their use in ancient cement, bricks and mortar.

***Keywords**: Petrography of mortar, Ancient cement, Anicut at Yan Oya*