



THE UNIVERSITY OF NEW SOUTH WALES

BUILDING RESEARCH CENTRE
The Faculty of the Built Environment

A SCANNING ELECTRON MICROSCOPY EXAMINATION
OF A CONCRETE CONTAINING XYPEX ADMIXTURE

FOR

XYPEX AUSTRALIA

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COMMERCIAL IN CONFIDENCE

**Report Prepared by the
Building Research Centre
University of New South Wales**

on

A SCANNING ELECTRON MICROSCOPY EXAMINATION OF A CONCRETE CONTAINING XYPEX ADMIXTURE

for

Xypex Australia

Job No. 42755

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Prepared by: **Z. Tian Chang (Research Engineer)**



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A SCANNING ELECTRON MICROSCOPY EXAMINATION OF A CONCRETE CONTAINING XYPEX ADMIXTURE

(November 2000, ACCI, UNSW)

INTRODUCTION

The Australian Centre for Construction Innovation (ACCI) was requested by Mr Gary Jackson of Xypex Australia to undertake a Scanning Electron Microscopy (SEM) examination of a concrete sample from a precast concrete slab. The concrete for the slab was modified with the Xypex C-2000NF waterproofing admixture.

Xypex C-2000NF is one of the Xypex products, which are generally described as crystalline waterproofing materials. According to the previous investigations [1, 2], needle type crystals are found to form in concrete either mixed with a Xypex admixture or applied with a Xypex surface application product.

SAMPLE FOR EXAMINATION

It was organised through Xypex Australia for ACCI staff to take a concrete sample from a precast concrete slab for the SEM examination. The concrete slab was a spare element cast in 1994 and left in the precast yard since then. The admixture Xypex C-2000NF had been added to the concrete mix to enhance the waterproof characteristics of the concrete.

A small lump of concrete was chiselled off the precast concrete slab at the precast yard. The concrete piece was brought back to the ACCI laboratory and cut with a diamond saw to get a suitable size of sample for the SEM examination.

The concrete sample was further prepared and coated with a very thin layer of gold to provide conductivity and other conditions well for SEM imaging.

SCANNING ELECTRON MICROSCOPY EXAMINATION

The prepared concrete sample was mounted on a 20mm diameter stub and examined with a Scanning Electron Microscope (SEM).

In general, the sample was found to be a dense concrete with very few large pore voids or cracks. However, within the voids found under the SEM, needle type crystals were observed. Figure 1 and 2 show the typical microscopic view of these crystals. The crystals appear to approach the "crystalline formation of dendritic fibres" described on the Xypex C-2000NF data sheets.

SUMMARY OF THE EXAMINATION

A concrete sample was taken from a concrete slab which was cast in 1994 with a concrete modified by the Xypex C-2000NF waterproofing admixture. The concrete sample was further prepared and examined with a Scanning Electron Microscope (SEM) for the evidence of crystalline formation in the concrete.

The concrete was found to be dense and of good quality. Needle type crystals were observed within the pore voids under the SEM. These needle crystals may be crystalline products of the reactions of Xypex C-2000NF in the concrete.

REFERENCE

1. Y. Mitsuki, M. Fujimoto and Y. Nakamura, "An Enhancement in the Nature of Concrete with a Multipliactive Cement Crystal Type Concrete Material", 46th Annual Meeting of the Civil Engineering Society, Japan, 1992.
2. A. Peek, D. Goh and F.W. Khiong, "Xypex Waterproofing – Singapore Arts Centre Project", Technical Report 1303/97/8426, (Singapore) Taywood Engineering Ltd., 1997

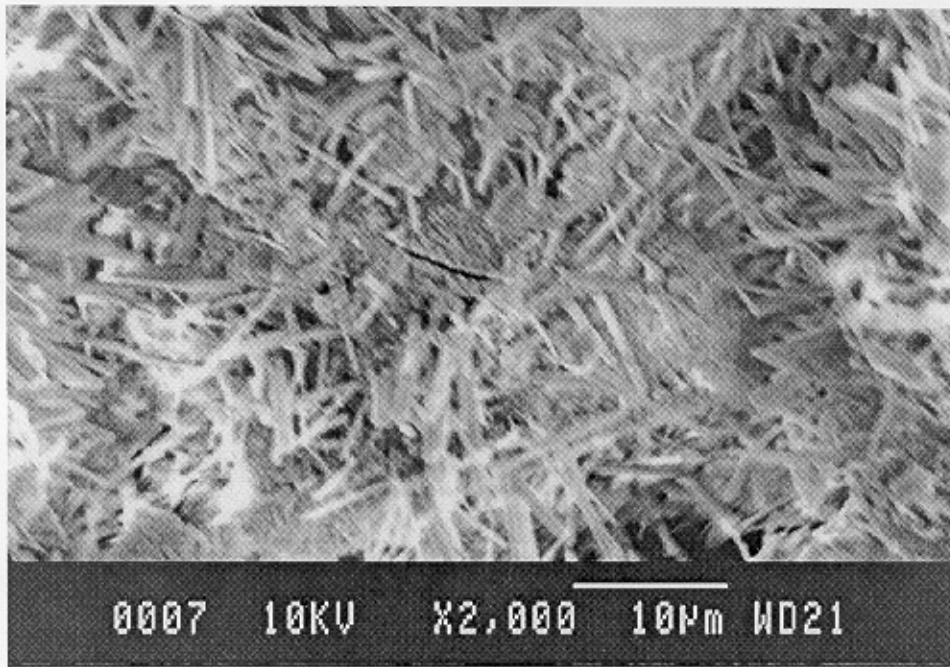


Fig-1. Needle Type Crystals (1) in the Concrete Sample

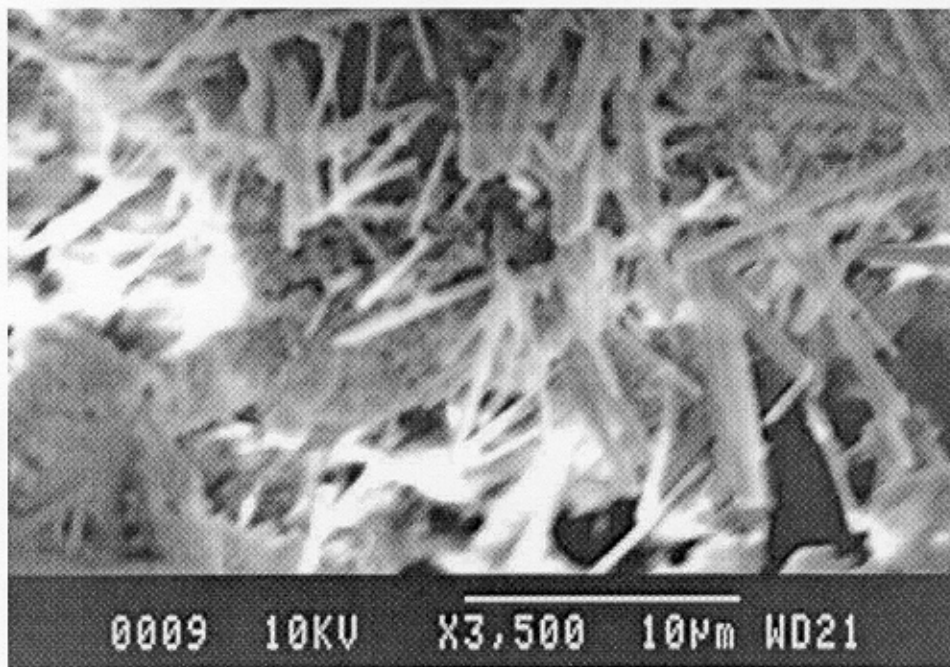


Fig-2. Needle Type Crystals (2) in the Concrete Sample