Mechanical Properties of SMFMZS (SrO-Mn_2O_3-Fe_2O_3-MgO-ZrO_2-SiO_2) System Glass Fibre Reinforced Concrete (GFRC) Materials

Arife Yurdakul[1], Goktug Gunkaya[2], Emrah Dolekcekic[3], Taner Kavas[4] and Bekir Karasu[3]*

[1] *Dumlupinar University, Faculty of Engineering, Department of Materials Science and Engineering, Kutahya, Turkey*

[2] *Anadolu University, Faculty of Fine Arts, Department of Ceramic-Glass, Eskisehir, Turkey*

[3] *Anadolu University, Faculty of Engineering, Department of Materials Science and Engineering, Eskisehir, Turkey*

[4] *Afyon Kocatepe University, Faculty of Engineering, Department of Materials Science and Engineering, Afyonkarahisar, Turkey*

ABSTRACT

Glass fibre reinforced concrete (GFRC) contains high-strength glass fibres that embedded in cement-based matrix. In such a composite structure, while the fibres are load carrying element, the matrix is base protecting fibres from the environmental effects and facilitates fibbers' motion. For this reason, Zrn1 coded glass fibres belonging to SMFMZS (SrO-Mn_2O_3-Fe_2O_3-MgO-ZrO_2-SiO_2) system was used as a reinforcing material to produce GFRC structures. With the standard sample, concretes which containing glass fibre at the rate of %1, %3 and %5 wt. were prepared and TS EN 196-1 standard procedure was used for the experimental studies. Analysis for the test samples were carried out in order to determine mechanical properties. According to results, Zrn1 coded glass fibre added concrete samples as 1 wt. % show better compressive strength than others.

Furthermore, the detailed micro-structural observations on the glass fibre reinforced concrete (GFRC) structures were made by SEM and energy dispersive X-ray spectroscopy (EDXS) combination. Consequently it has been determined that Zrn1 fibres can be used to get high durability and mechanical strength having concrete structures.

Keywords: SMFMZS system fibre, GFRC, Mechanical strength, Chemical durability, Characterisation.