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Preparation and characterization of continuous fly ash derived glass fibers with improved tensile strength

Qian Ma¹, Linfeng Ding^{2*}, Qingwei Wang^{1*}, Ye Yu¹, Lida Luo¹, Hong Li³

¹State Key Laboratories for Modification of Chemical Fiber and Polymer Materials, Donghua University,

Shanghai 201620, People's Republic of China

²Institute of Geosciences, Johannes Gutenberg University, 55128 Mainz, Germany

³Fiber Glass, Glass Business and Discovery Center, PPG Industries, Inc., Pittsburgh, Pennsylvania

*Corresponding author: dingli@uni-mainz.de, wqwq888@dhu.edu.cn

Abstract

The coal-based energy production in China generates more than 600 million tons of coal fly ash (CFA) each year, which drives us searching for new methods for recycling CFA. In this work, continuous glass fibers with a range of CFA (25 % - 45 %) were successfully prepared without showing any sign of fiber crystallization. The measured fiber tensile strength was found to increase with CFA proportionally. The fiber derived from 45 % CFA exhibited the best tensile strength (higher than the E glass fiber prepared/tested under the same conditions) and good chemical stability (98 % mass retention in the acid corrosion test). Our study shows a feasibility of making continuous CFA derived glass fibers with high iron oxide content and an alternative way for CFA recycling. Its improved strength and good chemical durability can benefit both economy and environmental protection.

Keywords: Continuous glass fiber, fly ash, tensile strength, chemical stability, recycling.

1. Introduction

Research on the utilization of coal fly ash (CFA) [1] has been carried out for several decades, which led to the development of several commercially viable

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