



HUTECH
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Viet Nam
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Fourth Industrial
Revolution

GSETS 2025
GREEN SOLUTIONS & EMERGING TECHNOLOGIES FOR SUSTAINABILITY

PROCEEDINGS

Of **The 2nd International Conference on**

**GREEN SOLUTIONS & EMERGING TECHNOLOGIES
FOR SUSTAINABILITY - GSETS 2025**



TRANSPORT PUBLISHING HOUSE

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Of The 2nd International Conference on

**GREEN SOLUTIONS & EMERGING TECHNOLOGIES
FOR SUSTAINABILITY - GSETS 2025**



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FOREWORD

The 2nd International Conference on "**Green Solutions and Emerging Technologies for Sustainability**" (GSETS) is a prestigious global scientific event that showcases the latest advancements in Material Science, Green Solution & Technology, Data Science, Artificial Intelligence, and other emerging technologies aimed at furthering the Sustainable Development Goals (SDGs). This conference, organized by HUTECH University and Viet Nam Centre for the Fourth Industrial Revolution (C4IR), is part of a series of events commemorating the 30th anniversary of the institution, from April 26, 1995, to April 26, 2025. GSETS 2025 presents an invaluable opportunity for researchers and scientists to exchange ideas, engage in discussions, and explore collaborative efforts in research and technology transfer within the relevant fields.

GSETS 2025's extensive scientific content is founded on the significant contributions of experts, scientists, and scholars from 12 different countries. The conference has garnered substantial interest, featuring 07 plenary talks, 26 invited presentations, and 220 submissions across a range of publishing options. These options include the Conference Proceedings, the Journal of Materials and Emerging Technologies for Sustainability (METS), a Special Issue of the Journal of Development and Integration (JDI), as well as Special Issues of the Vietnam Journal of Mechanics (VJM) and the Beilstein Journal of Nanotechnology (BJNANO). All accepted manuscripts have undergone a plagiarism check using Turnitin.

Furthermore, it is essential to acknowledge the invaluable contributions of the organizers, reviewers, participants, sponsors, and scientific journals, all of whom have played a pivotal role in ensuring the success of GSETS 2025. Together, these contributions highlight the collective commitment to advancing knowledge in sustainability and emerging technologies at GSETS 2025.

As GSETS 2025 unfolds, I sincerely hope that each participant will appreciate the significance of this year's conference. It is my aspiration that attendees will enhance their professional networks and develop new ideas to effectively address the challenges of sustainability. Your active involvement is vital for promoting collaboration and advancing our shared mission toward sustainable solutions.

Publishing Committee of GSETS 2025 Conference

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Launching ceremony of "Materials and Emerging Technologies for Sustainability" Journal

& The 2nd International Conference on GREEN SOLUTIONS AND EMERGING TECHNOLOGIES FOR SUSTAINABILITY (GSETS 2025) Ho Chi Minh City, 10-11 April 2025

Website: hutech.edu.vn/gsets2025
Email: gsets@hutech.edu.vn

PROGRAM	
DAY 1 - Thursday, April 10, 2025	
7:30 - 8:00	Registration Place: E3 Yard - Thu Duc Campus
8:00 - 9:00	<p>Launching ceremony of "Materials and Emerging Technologies for Sustainability" (METS) Journal</p> <p>Room: Hall E3-05.01 - Thu Duc Campus</p> <ul style="list-style-type: none"> - Welcome speech from Chairman of HUTECH University - Speech from Representative of World Scientific Publishing - Speech from Editor in Chief of METS Journal - Introduction of Editorial Board of METS Journal
9:00 - 10:00	<p>Opening ceremony of The 2nd International Conference on "Green Solutions and Emerging Technologies for Sustainability" (GSETS 2025)</p> <p>Room: Hall E3-05.01 - Thu Duc Campus</p> <ul style="list-style-type: none"> - Introduction of GSETS 2025 - Speech from Vice Chairman of Ho Chi Minh City People's Committee - Speech from Representative of Centre for the Fourth Industrial Revolution - Welcome speech from President of HUTECH University
10:00 - 12:00	<p>Plenary Session 1</p> <p>Room: Hall E3-05.01 - Thu Duc Campus</p> <p>Chairperson: <i>Prof. Marco Abbati, University of Bologna, Italy & Prof. Yuping Wu, Southeast University, China</i></p>
10:00 - 10:40 PL1	Recent Advances in Composite Polymer Electrolytes Integrated with Inorganic Fillers <i>Prof. Kim, Jae Hyun, Daegu Gyeongbuk Institute of Science & Technology, South Korea</i>
10:40 - 11:20 PL2	Artificial Intelligence in Computational Mechanics <i>Prof. Jaehong Lee, Sejong University, South Korea</i>
11:20 - 12:00 PL3	Nature based Solutions of The Sustainable Management of the Environment: Examples from Italy <i>Prof. Marco Abbati, University of Bologna, Italy</i>
12:00 - 13:00	Lunch Buffet - 2 nd Floor E2 Building - Thu Duc Campus

Parallel Session 2: E2 Building - Thu Duc Campus										
16:10 - 17:10	AMGM-3 Room: E2-03.03 Chairperson: <i>Prof. Nguyen Thanh Tung & Assoc. Prof. Nguyen Thai Hoang</i>		AMGM-4 Room: E2-03.04 Chairperson: <i>Prof. Nguyen Trung Kien & Prof. Nguyen Quoc Hung</i>		DSAL-3 Room: E2-04.03 Chairperson: <i>Assoc. Prof. Nguyen Anh Thi & Assoc. Prof. Nguyen Thanh Phuong</i>		STSD-3 Room: E2-04.04 Chairperson: <i>Assoc. Prof. Phan Dinh Nguyen</i>		STSD-4 Room: E2-04.08 Chairperson: <i>Assoc. Prof. Nguyen Hung</i>	
	13	Synthesis of Sustainable Geopolymer Cement: Utilizing Glove Former Waste and Coloured Glass as a Green Alternative to Ordinary Portland Cement Assoc. Prof. Kah Hon Leong, UTAR, Malaysia	17	Magneto-Rheological (MR) Technology for Shock and Vibration Control Prof. Xianxu Frank Bai, HFUT, China	19	An Advanced Framework for Accurate PPE Detection and Real-Time Surveillance Dr. Huynh Quoc Bao, HUTECH, Vietnam	110	Circular Economy Development in Vietnam: Recent Efforts and The Way Forward Assoc. Prof. Nguyen Hong Quan, ICED, VNU-HCM, Vietnam	O28	Analysis of Exhaust Gases and Forecasting Emission Characteristics of Main Engines on Actual Ships Assoc. Prof. Vu Duong, DTU, Vietnam
	14	Carbon Aerogel from Coconut Fiber with Thiourea cross-linking agent for Capacitive Deionization Applications Assoc. Prof. Nguyen Thai Hoang, HCMUS, VNU-HCM, Vietnam	O7	Forming Limit Prediction of Advanced High-Strength Steels (AHSS) Using an Enhanced Ductile Damage Model Dr. Hao H. Nguyen, UTC, Vietnam	O14	Enhancing Ramp Safety in Aviation Through Virtual Reality: A Sustainable and Risk-Free Training Approach Dr. Van Thuan Luu, VAA, Vietnam	111	The Impact of Green Factors on Environmental Management Accounting to Enhance Environmental Performance: A Case Study of Manufacturing Enterprises in Vietnam Assoc. Prof. Tran Van Tung, HUTECH, Vietnam	O29	An Analytical Study of Electro-Conjugate Fluid Micropump under the Effects of the Collector Electrode Assoc. Prof. Ich Long Ngo, HUST, Vietnam
	O3	Evaluation on The Utilization of Glass Textile within the Cementitious Composites Dr. Van Doan Truong, TLU, Vietnam	O8	Investigation Factors Affecting Tensile Strength based on Taguchi Method of PLA Parts Manufactured by Delta-FDM 3D Printing Technology Tran Anh Khoa, HCMUTE, Vietnam	O15	Augmented Security Solution for X448 Protocol Implemented in Authentication and Data Protection of Smart Home Networks Dr. Van Nghi Nguyen, ACT, Vietnam	O23	Evaluating the Sustainable Performance of International Airlines: Application of Shannon entropy and CoCoSo methods Le-Thanh-Hieu Dang, NKUST, Taiwan	O30	Theoretical Analysis of A Solar Water Distillation Using Receiver and Condenser Tubes Dr. Hieu Tri Le, HUTECH, Vietnam
	O4	In-situ Atomic-Layer-Resolved Electrical Characterization of SnO ₂ Thin Films Deposited by Atmospheric Pressure Spatial Atomic Layer Deposition Dinh Nam Nguyen, Phenikaa Univ., Vietnam	O9	Research on A Flow-Mode Magneto-Rheological Impact Damper with Stroke-Activated Capability Huu-Quan Nguyen, IJH, Vietnam	O16	A Comparative Analysis of Learning Algorithms for Solar Power Generation Forecasting Vu Thi Ngoc Han Danh, HCMUTE, Vietnam	O24	Evaluating the Impact of Project Design Education on Students' Innovation and Entrepreneurial Thinking: An empirical case study at HUTECH University Xuan-Hung Nguyen, HUTECH, Vietnam	O31	Design and Implementation of a Battery Management System for Lithium-Ion Batteries with Real-Time Monitoring and Remote Control Thanh-Danh Truong, TDMU, Vietnam
					O17	Classification of Photovoltaic Fault Using CatBoost Classifier Optimized QPSO Hoang-Phuong Van, CYCU, Vietnam			O32	Development of a Testing Platform for Fuel Cell Thermal Management Systems Do Thi Ngoc Anh, HANU, Vietnam
GALA Dinner - Hotel										
17:10 - 22:00										

DAY 2 - Friday, April 11, 2025						
Parallel Session 3: E2 Building - Thu Duc Campus						
7:30 - 8:30	AMGM-5 Room: E2-03.03 Chairperson: Prof. G. Arthanareeswaran & Assoc. Prof. Le Van Lich	AMGM-6 Room: E2-03.04 Chairperson: Prof. Nguyen Quoc Hien & Prof. Kim, Jae Hyun	AMGM-7 Room: E2-03.08 Chairperson: Prof. K. Jothivelkatchalam & Assoc. Prof. Jonggol Tantrirongtechai	STSD-5 Room: E2-04.03 Chairperson: Prof. Usha K. Aravind & Assoc. Prof. Tran Hoang Phuong	STSD-6 Room: E2-04.04 Chairperson: Prof. Collin G. Joseph & Assoc. Prof. Doan Le Hoang Tan	STSD-7 Room: E2-04.08 Chairperson: Prof. Kenji Urayama & Assoc. Prof. Doan Duc Chanh Tin
	I15 Defect-engineering in Photocatalysis for Sustainable Energy and Environment Prof. Chuanyi Wang, SUST, China	I17 Radiation Processing Technology for Preparation of Nanomaterials Prof. Nguyen Quoc Hien, VAEC, Vietnam	I19 Biopolymer based Metal Nanocomposite Materials for Energy and Environmental Applications Prof. K. Jothivelkatchalam, Anna Univ., India	I21 Eco-friendly Catalysts for Organic Synthesis and Biomass Conversion Assoc. Prof. Tran Hoang Phuong, HCMUS, VNU-HCM, Vietnam	I23 Cellulose Paper: Exploring Its Photocatalytic Efficiency in Organic Pollutant Degradation Prof. C. T. Aravindakumar, MGU, India	I25 Enhanced Sensitivity for Electrochemical Detection of Heavy Metal Ions in Water Using the Nano-Structured Layers and Nanomaterial Blends Assoc. Prof. Doan Duc Chanh Tin, INT, VNU-HCM, Vietnam
	I16 Nanomechanical Energy Storage Capacity and Sealing Laws of Three-Dimensional Graphene Nanostructures Assoc. Prof. Le Van Lich, HUST, Vietnam	I18 Green Hydrogen Production from Seawater Electrolysis Dr. Tran Ngoc Quang, INOMAR, VNU-HCM, Vietnam	I20 Atmospheric Pressure Spatial Atomic Layer Deposition: A Green Solution for Advancing Functional Thin Films and Sustainable Technologies Dr. Nguyen Viet Huong, Phenikaa Univ., Vietnam	I22 Polyelectrolyte Multilayer-Modified Membranes for Sustainable Dye and Salt Separation in Textile Effluent Treatment Prof. Usha K. Aravind, CUSAT, India	I24 Advancing Targeted Cancer Therapy with Biodegradable Porous Nanoparticles Assoc. Prof. Doan Le Hoang Tan, INOMAR, VNU-HCM, Vietnam	I26 Study on the Modified Red Mud for the Removal of Pb ²⁺ in Industrial Wastewater Assoc. Prof. Dang Tan Hiep, HUIT, Vietnam
	O35 A DFT Study of Selective Dye Adsorption on MCM-41 Mesoporous Materials Natthakit Singhanakaisi, Thammasat Univ., Thailand	O37 Multiaxial Stress-Softening and Crack Behavior of Soft Materials Dr. Thanh-Tam Mai, Kyoto Univ., Japan	O39 Improving Image-Quality of Wide-Field Optical Microscopy by Removing Background Assoc. Prof. Vannhu Le, LQDTU, Vietnam	O41 Enhance Photoelectrochemical Performance BIO derived BiVO ₄ Film By Controlled Intensity Current Electrodeposited Dr. Huu Phuc Dang, IUH, Vietnam	O43 A Glucose-Derived Bifunctional Carbonaceous Catalyst for the Synthesis of Furfural from Xylose Vinh Thanh Chau Doan, HCMUS, VNU-HCM, Vietnam	O45 Off-Grid Green High-Purity Hydrogen Production Using a 10kW Electrolyser Powered by Solar Energy via DC/DC Converter Dr. Minh Vuong Pham, DFIM-Group, Vietnam
	O36 Supramolecular Hydration Structure of Graphene-Based Hydrogels: Density Functional Theory, Green Chemistry and Interface Application Hon Nhlen Le, HCMUS, VNU-HCM, Vietnam	O38 Palladium-Nickel (PdNi) Electrochemical Catalyst Supported by High Porous Amorphous Bio-Silica from Rice Husk for Glucose Sensor Anh T. M. Vo, HCMUT, VNU-HCM, Vietnam	O40 Study on Synthesis of Vegan Leather from Agricultural Waste of Dragon Fruit Plants Dr. Le Minh Tam, HCMUTE, Vietnam	O42 Advanced Atomic Layer Deposition Coatings for UV Protection and Dust Resistance on Polymer Composite Material Hung-Anh Tran Vu, Phenikaa Univ., Vietnam	O44 Functional Bio-Packaging Enhanced with Nanocellulose from Rice Straw and Cinnamon Essential Oil Pickering Emulsion for Fruit Preservation Hieu D. Nguyen, HCMUT, VNU-HCM, Vietnam	O46 Fabrication of TiO ₂ Electrodes for Water Splitting of Hydrogen Evolution Reaction Le Ngoc Can, HCMUS, VNU-HCM, Vietnam
8:30 - 8:45	Tea Break					
8:45 - 11:40	Plenary Session 2 Room: Hall E3-05.01 - Thu Duc Campus Chairperson: Prof. Kenji Urayama, Kyoto University, Japan & Prof. Kim, Jae Hyun, Daegu Gyeongbuk Institute of Science & Technology, South Korea Research and Development of Electrochemical Energy Storage in China to Push Reduction of Carbon Emission Prof. Yuying Wu, Southeast University, China Mission Possible: Aligning Science and Technology with Societal Needs Assoc. Prof. Ritesh Chugh, Central Queensland University, Australia Illuminating Cracks: Advanced Imaging in Soft Solid Mechanics Prof. Kenji Urayama, Kyoto University, Japan How Can Digital Technologies and AI Help Decarbonise The Building Industry and Address Productivity Challenges? (Online via Google Meet) Prof. Tuan Ngo, The University of Melbourne, Australia					
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11:00 -11:40	PL7					
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12:30 - 13:30	Lunch Buffet - 2 nd Floor E2 Building - Thu Duc Campus					
13:30 - 17:00	Ho Chi Minh City Tour					

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Evaluation on the utilization of glass textile within the cementitious composites

Van Doan Truong^{1,*}, Van Phi Dang², Tri Thuong Ngo¹,
Ngoc Thanh Tran^{3,4}, Duc Trong Nguyen⁵

¹Thuyloi University, 175 Tay Son, Dong Da, Hanoi, Viet Nam

²Hanoi University of Mining and Geology, No.18 Pho Vien, Bac Tu Liem,
Hanoi, Viet Nam

³Institute of Civil Engineering, Ho Chi Minh City University of Transport,
02 Vo Oanh, Binh Thanh, Ho Chi Minh City, Viet Nam

⁴Research Group CESD, Ho Chi Minh City University of Transport,
02 Vo Oanh, Binh Thanh, Ho Chi Minh City, Viet Nam

⁵Campus in Ho Chi Minh City, University of Transport and Communications, 450-451
Le Van Viet Street, Tang Nhon Phu A Ward, Thu Duc City, Ho Chi Minh City, Viet Nam

**Corresponding author, Email: doantv@tlu.edu.vn*

ABSTRACT

This paper evaluated the utilization exhibiting the reinforcement efficiency of glass textile (GT) within the cementitious composites under tension. The tensile tests at a static rate of 0.000333 s^{-1} , using a universal test machine (UTM) and the dog-bone-shaped specimens, and the tests at high strain rates ranging from 30 to 100 s^{-1} , using an improved strain energy frame impact machine (I-SEFIM) and cutting dog-bone-shaped specimen, were conducted. The results showed that glass textile produced significantly high tensile utilization, exhibiting high reinforcement efficiency within textile reinforced cementitious composites (TRCCs), because of its strong bond within the mortar matrix. The utilization of GT within TRCCs ranged from 80% to 190%. The utilization of GT was sensitive to high strain rates due to its rate - sensitive interfacial bond strength, generated by the inertial effects of mortar matrix surrounding GT. The utilization of GT within TRCCs at high strain rates was approximately from 2 to 2.5 times higher than that within TRCCs at static. TRCCs at static produced a trilinear behavior at static consisting of initial elastic, crack formation, and crack widening stages, whereas those at high strain rates did a strain hardening one including initial elastic, strain hardening, and softening stages.

Keywords: Utilization, glass textile (GT), textile reinforced cementitious composites (TRCCs), different strain rates, dynamic increase factor on the utilization.

1. INTRODUCTION

There has a demand on enhancing the resistance of building and infrastructures under high rate loads to limit numerous catastrophic fractures because of the impact, machine vibration, blasts, earthquakes (Heravi et al. 2020; Truong et al. 2022; Zhu et al. 2011).

Textile reinforced cementitious composites (TRCCs), incorporating the textiles as reinforcements within fine-grained cementitious mortar, an advanced material with high strength, ductility, and energy absorption capacity emerged as a promising solution for retrofitting old buildings and constructing new lightweight elements (Arboleda et al. 2016; Heravi et al. 2020; Peled et al. 2017; Truong et al. 2022; Zhu et al. 2011).

The mechanical properties of reinforcements were significantly depended on the efficiency of reinforcements, which required to optimally develop. To investigate the efficiency of reinforcements within the composites, the utilization factor of reinforcement was evaluated based on some factors such as fiber volume fraction, interfacial bond between textiles and cement-based matrix, and mechanical properties of reinforcements (Naaman, 2008; Wille et al. 2011). Wille et al. (2011) focused on the χ_u of various fibers such as smooth, hooked, twisted fibers within ultra-high performance fiber reinforced concrete. The χ_u of smooth fibers ranged from 28 to 29%, that of hooked fibers was 43%, and that of twisted fibers was from 29 to 38%, which indicated that the bond between fibers and mortar matrix should be improved to enhance the utilization of fibers within the composites (Wille et al. 2011). The increase in fiber volume content resulted in the decrease in the utilization factor of fibers due to fiber group effects (Wille et al. 2011).

Truong et al. (2022) recently investigated the utilization of glass (GT) and carbon textile (CT) within TRCCs at static. The results showed that the χ_u of normal GT (ranged from 70 to 96%) were significantly higher than that (ranged from 25 to 42%) of normal CT (Truong et al. 2021). According to previous investigations (Peled et al. 2017; Truong et al. 2021, 2022), GT generated sufficient bond whereas CT did insufficient bond within cement-based matrix. Consequently, GT developed significantly higher reinforcement efficiency than CT. Both GT and CT produced higher utilization than steel fibers, which could be attributed to the orientation of reinforcements. Textiles were orientated in one-dimension, generating higher orientation factor, whereas steel fibers were free-distributed within cement-based matrix, generating lower orientation factor (Peled et al. 2017). Consequently, textile produced higher utilization factor than fibers. Although these investigations evaluated the utilization of both short fibers and textile reinforcement, they focused on only the utilization of reinforcements measured at static.

The high strain rate effects on the tensile resistance of TRCCs (Silva et al. 2011; Truong et al. 2022; Yao et al. 2015; Zhu et al. 2011, 2012). According to (Zhu et al. 2011, 2012), the tensile strength of TRCCs increased, as the strain rate increased. Different trends were observed in the strain capacity and energy absorption capacity of TRCCs, in which they decreased in (Silva et al. 2011; Yao et al. 2015), but increased in Zhu et al. (Zhu et al. 2011, 2012), due to the increase in the strain rates. Recently, Truong et al. (Truong et al. 2022) investigated the rate-sensitive resistance of TRCCs and concluded that the tensile strength, strain capacity, and energy absorption capacity of TRCCs significantly increased with the increase in the strain rate, and the bond between textile and mortar matrix was a main factor in rate dependency of TRCCs. Although the high strain rates effects on the tensile resistance of TRCCs were clarified in previous studies, the information of rate dependency of textile reinforcement's utilization within the composites was still limited.

This study evaluated the utilization factor of GT within cement-based matrix. The detailed objectives include (1) to investigate the tensile characteristics of TRCCs using GT, (2) to study the utilization of GT within mortar matrix, and (3) to evaluate the rate dependency of reinforcement's utilization factor.

2. EXPERIMENTS

An experimental program was conducted to study the utilization (U) of glass textile within the cementitious composites, as shown in Figure 1. Glass textile (GT) was used as reinforcement to prepare the specimens of glass textile reinforced cementitious composites. The tests were conducted at different strain rates including static (R1) (0.000333 s^{-1}), seismic-static (R2) (0.00333 s^{-1}), high strain rates (R3) ($30 - 50 \text{ s}^{-1}$), and high strain rates (R4) ($70 - 100 \text{ s}^{-1}$). The tests at R1 and R2 used a universal testing machine (UTM) whereas the tests at R3 and R4 used an improved strain energy frame impact machine (I-SEFIM). Totally, 4 series were prepared, as shown in Figure 1.

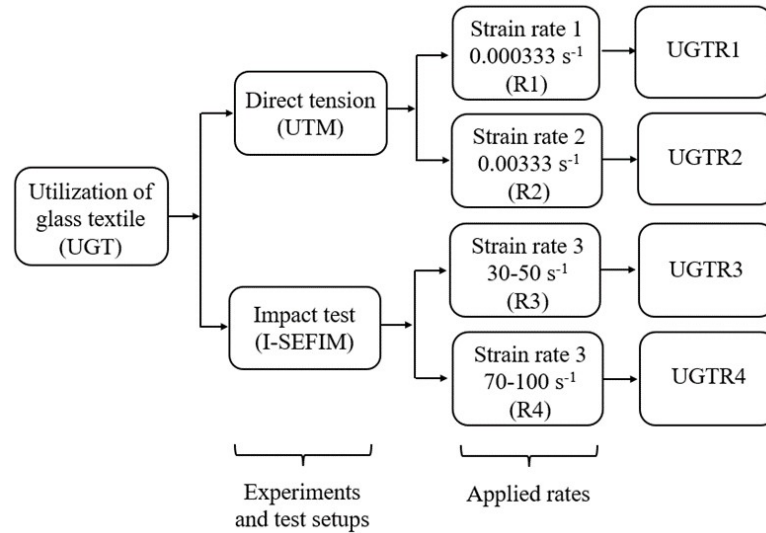


Figure 1. Experimental program

2.1. Materials

GT, with yarn's tensile strength of 1200 MPa, textile's breaking load of 4600 N, density of 2680 kg/m^3 , was used as textile reinforcement, which was illustrated in Figure 2 of Section 2.2. Each GT yarn including two single yarns. The calculated volume content of GT within specimen was 1.47%. Cement type 1 (C) with a fineness of $3630 \text{ cm}^2/\text{g}$, silica sand (S) with an average diameter of 0.5mm, pure water (W), and superplasticizer (SP) with 25% solid were used to prepared the mixture of mortar matrix. The weight ratio of C/S/W/SP was 1/1.5/0.45/0.0009. The physical properties of reinforcement, matrix components, weight ratio of matrix compositions, and volume content of reinforcement were also be detailed in (Truong et al. 2021, 2022, 2023).

2.2. Specimen preparation

Figure 2 illustrates the procedure of specimen preparation. Cement-based matrix was mixed in a 20-L mixer. C and S were first dry-mixed for 10 mins before W and SP were gradually added and mixed for additionally 5-10 mins. Prior to casting, the workability of mixture was checked. The specimens were prepared using dog-boned shape molds. First layer of cement-based matrix was poured into the molds and smoothed, and textile layer was then put in the smoothed cement-based matrix. The cement-based matrix was continuously poured to fill the molds. The cast specimens were dry-cured in the laboratory for 24 hours prior to be demolded then be cured in water for 28 days. The details of casting could also be found in (Truong et al. 2021, 2022, 2023). After curing, some specimens were cut at one end to become cutting-dog bone shape specimen used for impact tests.

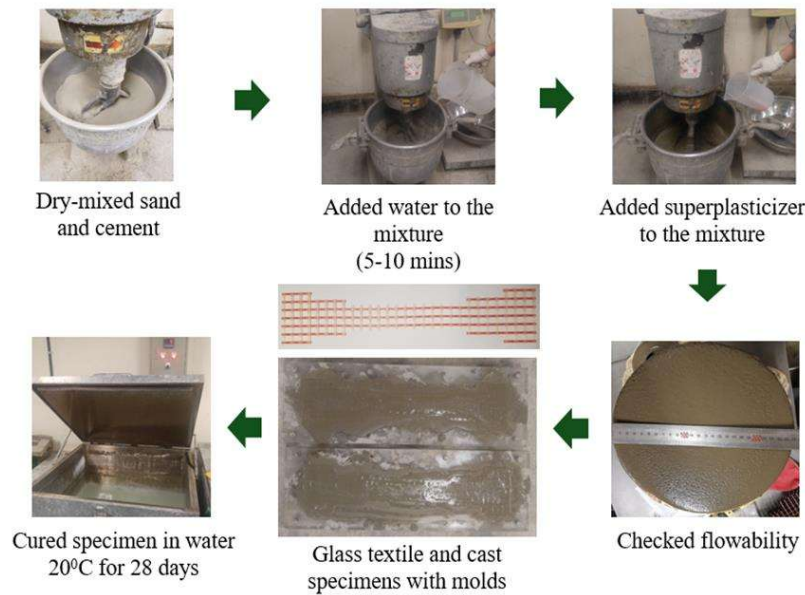


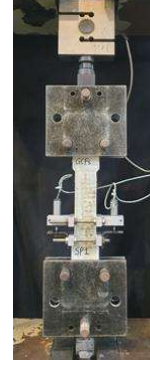
Figure 2. Specimen preparation procedure

2.3. Test setups

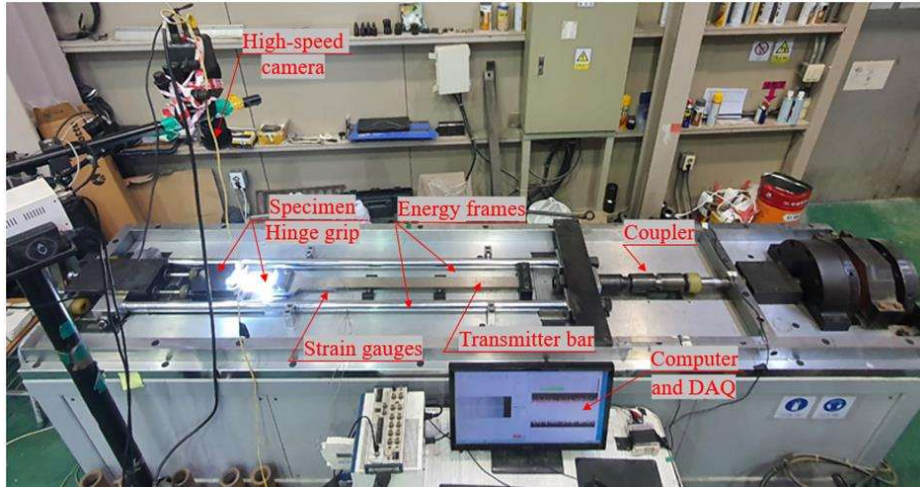
Figure 3 shows the test setups and specimens used in this study. The dog-boned specimen, as shown in Figure 3a, and a universal testing machine (UTM) with the operated displacement speed of 1 mm/ min, as shown in Figure 3b, were used for direct tensile tests at R1 and R2, whereas the cutting dog-bone specimen, as shown in Figure 3a, and an improved strain energy frame impact machine (I-SEFIM), as shown in Figure 3c, were used for impact tests at R3 and R4. During direct tensile testing at static, two LVDTs and load cell measured the strain and tensile load, respectively. As shown in Figure 3c, the impact was operated by stretching the coupler using a hydraulic jack, resulting in the stress wave propagating to specimen through strain energy frames and gripping system. The stress wave was measured by two strain gauges attached at both sides of transmitter bar, then analyzed using a data acquisition (DAQ) and computer to obtain the impact stress, whereas the strain was measured by analyzing the video of specimen during testing captured by a high-speed camera, as shown in Figure 3c. The details of test setups and implementation could also be found in previous studies (Tran et al. 2015; Truong et al. 2021, 2022).



(a) Dog-bone and cutting dog-bone specimens



(b) Direct tensile test setup at static



(c) Impact test setup

Figure 3. Test setups and specimen

3. RESULTS AND DISCUSSION

The utilization of reinforcements, representing the efficiency reinforcements within cement-based matrix, was evaluated by measuring the utilization factor, according to (Naaman, 2008; Peled et al. 2008; Truong et al. 2021; Wille et al. 2011), as shown in Eq. (1):

$$\chi_u = \frac{\sigma_u}{\sigma_{cu}} = \frac{\sigma_u}{\alpha_2 V_f \sigma_{fu}} \quad (1)$$

where: σ_u and σ_{cu} were the ultimate and assumed tensile strength of the composites, respectively, whereas α_2 , V_f , and σ_{fu} were the orientation factor, volume content, and ultimate tensile strength of the longitudinal yarns, respectively. The orientation factor α_2 was assumed as 1 for an one-dimensional orientation, $2/\pi$ for a two-dimensional orientation, and 0.5 for a three-dimensional orientation, (Naaman, 2008; Peled et al., 2008; Truong et al. 2021; Wille et al. 2011). In this study, the value of α_2 was equal to 1 because the longitudinal

yarns, primarily carrying the applied load, were orientated in one-dimension (Truong et al. 2021, 2022). Moreover, the ultimate tensile stress and strain capacity of TRCCs were also calculated to evaluate their tensile resistance.

Figure 4 shows the tensile behavior of TRCCs at different rates. As shown in Figure 4, the tensile stress - strain curves of TRCCs at R1 and R2 exhibited a trilinear behavior, whereas those of TRCCs at R2 and R3 illustrated a strain hardening ones (Truong et al. 2021, 2022, 2023). The trilinear behavior of TRCCs at static was characterized by the initial elastic, formation of cracks, and widening of cracks phases (Arboleda et al. 2016; Peled et al. 2017; Truong et al. 2021). The initial elastic phase was illustrated by a linear branch from starting up to the first cracking point, in which TRCCs was in elastic range (Arboleda et al. 2016; Peled et al. 2017; Truong et al. 2021). The phase of crack formation was from the cracking of first crack to that of final crack, whereas each crack corresponded to the drop of stress in the curves (Arboleda et al. 2016; Peled et al. 2017; Truong et al. 2021). During the phase of crack widening, the cracked were widened without any further cracks until the highest points. After highest point, the stress rapidly dropped to zero because the specimen was broken (Arboleda et al. 2016; Peled et al. 2017; Truong et al. 2021).

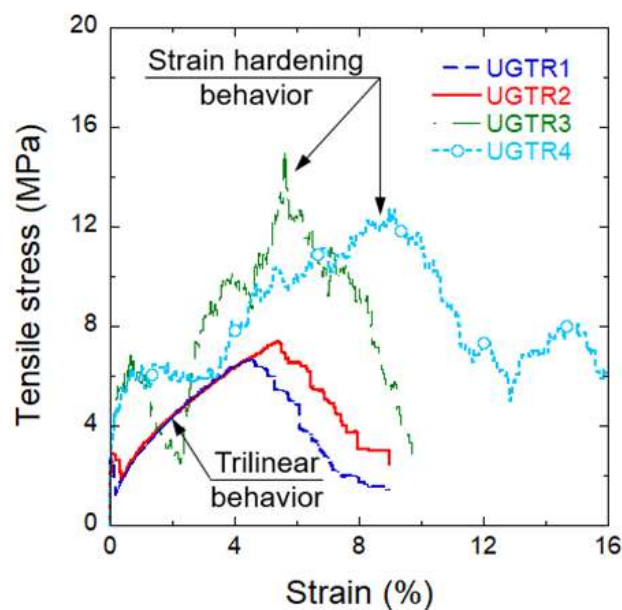


Figure 4. Tensile behavior of TRCCs

As shown in Figure 4, the tensile strain hardening behavior of TRCCs at high strain rates was characterized by the initial elastic, strain hardening, and softening phases (Heravi et al. 2020; Silva et al. 2011; Zhu et al. 2012). In the initial elastic phase, TRCCs was in elastic region without any cracking (Heravi et al. 2020; Silva et al. 2011; Zhu et al. 2012). In the strain hardening phase, illustrated by the branch from first cracking to the ultimate point, multiple cracks were formed (Heravi et al. 2020; Silva et al. 2011; Zhu et al. 2012). The stress significantly dropped during softening phase after highest point.

Figure 5 illustrated the tensile stress and strain of TRCCs. As shown in Figure 5, the tensile parameters of TRCCs increased with the increase in the strain rates. The tensile stress

of TRCCs at R1 (6.89 MPa) increased to 7.53 MPa at R2, and to 16.07 and 14.94 MPa at R3 and R4, respectively, whereas their tensile strain capacity increased from 4.62% of at R1 to 5.54% at R2, 5.85% at R3, and 8.45% at R4 (Truong et al. 2022, 2023). The improved tensile characteristics of TRCCs could be related to the enhanced interfacial bond strength between textile and cement-based matrix (Heravi et al. 2020; Mechtcherine et al. 2011; Truong et al. 2022; Zhu et al. 2012). Because high rate loading resulted in the inertial force to the specimen, an additional pressure stressed to cement-based matrix surrounding to textile, leading to improve the bond of textile (Heravi et al. 2020; Mechtcherine et al. 2011; Truong et al. 2022; Zhu et al. 2012). The tensile characteristic of TRCCs was consequently improved at high loading rates.

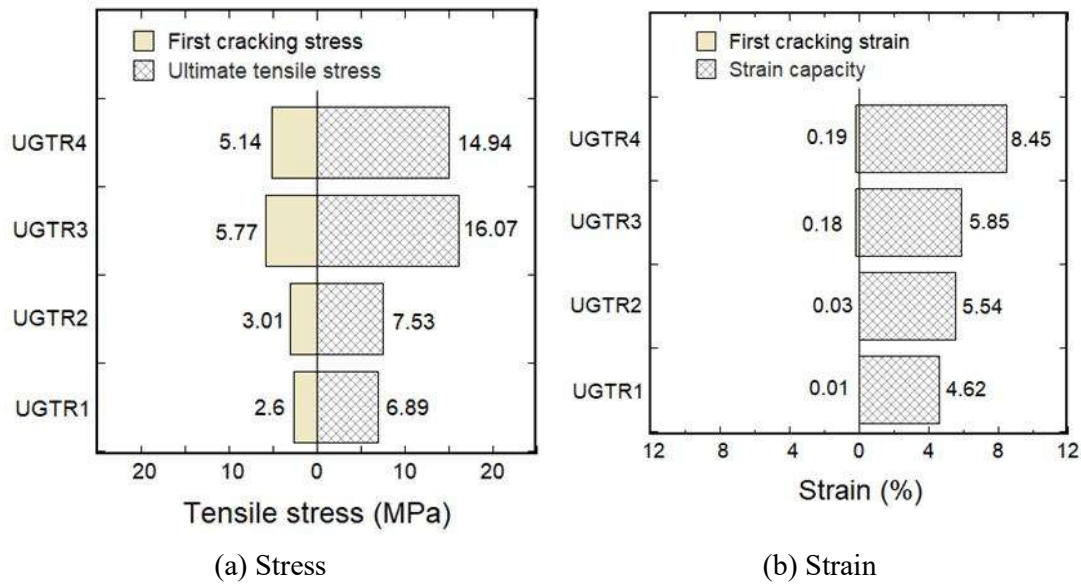


Figure 5. Tensile stress versus strain of TRCCs

Figure 6 illustrates the utilization of GT within cement-based matrix and its rate dependency. As shown in Figure 6a, the utilization factor of GT was approximately from 80 to 90% at static and seismic - static whereas that at high strain rates was approximately 190%. These results showed that the utilization factor of GT was very high, optimally developing the reinforcement efficiency (Bompadre & Donnini, 2021; Truong et al. 2021). According to (Bompadre & Donnini, 2021; Truong et al. 2021), the interfacial bond of GT was enough to fix it within cement-based matrix until its tensile strength was obtained, and GT was fractured after testing. Consequently, the reinforcement efficiency could be optimal, and the tensile performance of TRCCs and utilization of GT were significant (Truong et al. 2021). These results motivated the feasibility on the use of TRCCs with GT in constructing new structures and strengthening and/or retrofitting building and infrastructure under high-rate loading.

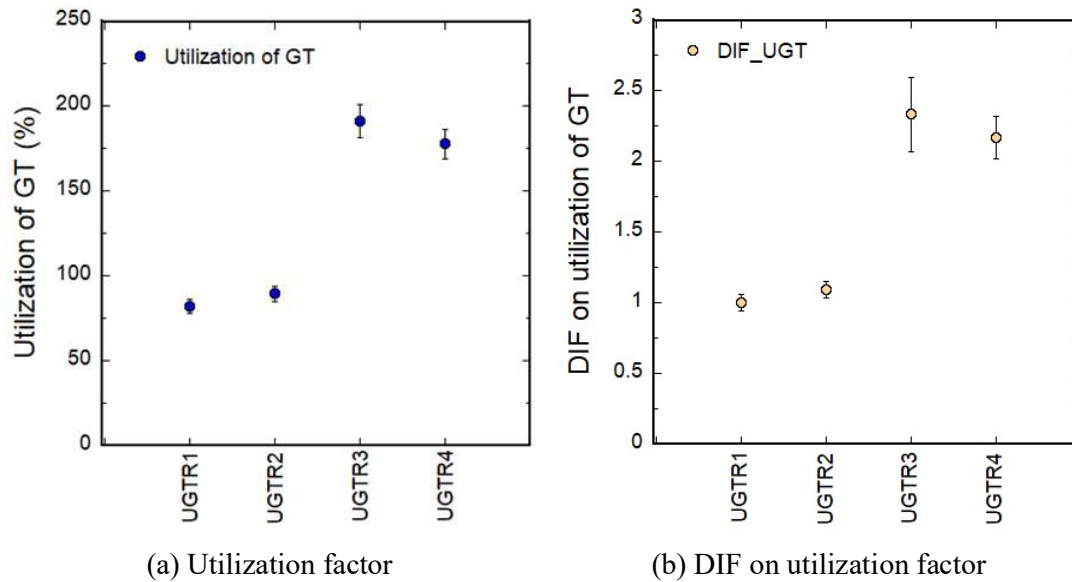


Figure 6. Utilization of GT and its rate dependency

Interestingly, the utilization of GT was sensitive to high strain rates. As shown in Figure 6b, the DIF_UGT increased from 1 to 2.4, as the strain rate increased from R1 to R4. As mentioned above, the interfacial bond strength between GT and cement-based matrix was a key source of tensile rate dependency (Heravi et al. 2020; Mechtcherine et al. 2011; Truong et al. 2022; Zhu et al. 2012), which was enhanced due to the inertial effect generating at high strain rate. Consequently, the enhanced bond strength of reinforcement improved the utilization and tensile characteristic of the composites.

4. CONCLUSION

This study evaluated the utilization of GT within cement-based matrix. The direct tensile behavior at both static and high strain rates were evaluated. The utilization of GT and their rate dependency were also studied. The following aspects could be concluded:

- The composites containing GT exhibited the trilinear behavior at static with initial elastic, crack formation, and crack widening phases, and did the strain hardening one at high-rate loading with elastic, strain hardening, and strain softening ones.
- GT generated relatively high utilization, ranging from 80 to 190%, within cement-based matrix, as the loading rates increased from static to high strain rates of below 100 s^{-1} , because of high interfacial bond characteristic between it and cement-based matrix.
- The utilization of GT and tensile strength of TRCCs containing GT were sensitive to high-rate loading regarding to the inertial effects: the DIF_UGT of TRCCs were from 1 to 2.4, as the strain rates ranged from R1 to R4.

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REFERENCES

1. Arboleda, D., Carozzi, F. G., Nanni, A., & Poggi, C. (2016). Testing procedures for the uniaxial tensile characterization of fabric-reinforced cementitious matrix composites. *Journal of Composites for Construction*, 20(3)(04015063), 1–11.
2. Bompadre, F., & Donnini, J. (2021). Surface modification of glass textile for the reinforcement of a cement-based composite: A review. *Applied Sciences*, 11.
3. Heravi, A. A., Fuchs, A., Gong, T., Curosu, I., Kaliske, M., & Mechtcherine, V. (2020). Mechanical characterization of textile reinforced cementitious composites under impact tensile loading using the split Hopkinson tension bar. *Cement and Concrete Composites*, 114(June), 103769.
4. Mechtcherine, V., Millon, O., Butler, M., & Thoma, K. (2011). Mechanical behaviour of strain hardening cement-based composites under impact loading. *Cement and Concrete Composites*, 33(1), 1–11.
5. Naaman, A. E. (2008). High performance fiber reinforced cement composites. In: Caijun S, Mo YL (Eds) *High-Performance Construction Materials. Science and Applications*, 91–153.
6. Peled, A., Cohen, Z., Pasder, Y., Roye, A., & Gries, T. (2008). Influences of textile characteristics on the tensile properties of warp knitted cement based composites. *Cement and Concrete Composites*, 30(3), 174–183.
7. Peled, A., Mobasher, B., & Bentur, A. (2017). *Textile reinforced concrete* (A. Bentur & S. Mindess (eds.); Modern Con). Taylor & Francis Group, LLC.
8. Silva, F. de A., Butler, M., Mechtcherine, V., Zhu, D., & Mobasher, B. (2011). Strain rate effect on the tensile behaviour of textile-reinforced concrete under static and dynamic loading. *Materials Science and Engineering A*, 528(3), 1727–1734.
9. Tran, N. T., Tran, T. K., & Kim, D. J. (2015). High rate response of ultra-high-performance fiber-reinforced concretes under direct tension. *Cement and Concrete Research*, 69, 72–87.
10. Truong, V. D., Lee, D. H., & Kim, D. J. (2021). Effects of different grips and surface treatments of textile on measured direct tensile response of textile reinforced cementitious composites. *Composite Structures*, 278(114689), 114689.
11. Truong, V. D., Noh, H. W., & Kim, D. J. (2022). Rate-sensitive tensile resistance of glass textile reinforced cementitious composites. *Construction and Building Materials*, 360, 129553.
12. Truong, V. D., Noh, H. W., & Kim, D. J. (2023). Effects of adding short fibers on impact resistance of glass textile reinforced cementitious composites under direct tension. *Construction and Building Materials*, 379, 131220.
13. Wille, K., Kim, D. J., & Naaman, A. E. (2011). Strain-hardening UHP-FRC with low fiber contents. In *Materials and Structures* (Vol. 44, Issue 3, pp. 583–598).

14. Yao, Y., Silva, F. A., Butler, M., Mechtcherine, V., & Mobasher, B. (2015). Tension stiffening in textile-reinforced concrete under high speed tensile loads. *Cement and Concrete Composites*, 64, 49–61.
15. Zhu, D., Mobasher, B., & Rajan, S. D. (2012). Non-contacting strain measurement for cement-based composites in dynamic tensile testing. *Cement and Concrete Composites*, 34(2), 147–155.
16. Zhu, D., Peled, A., & Mobasher, B. (2011). Dynamic tensile testing of fabric-cement composites. *Construction and Building Materials*, 25(1), 385–395.

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Website: www.nxbgtvt.vn Email: nxbgtvt@fpt.vn

RESPONSIBLE FOR PUBLISHING

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