



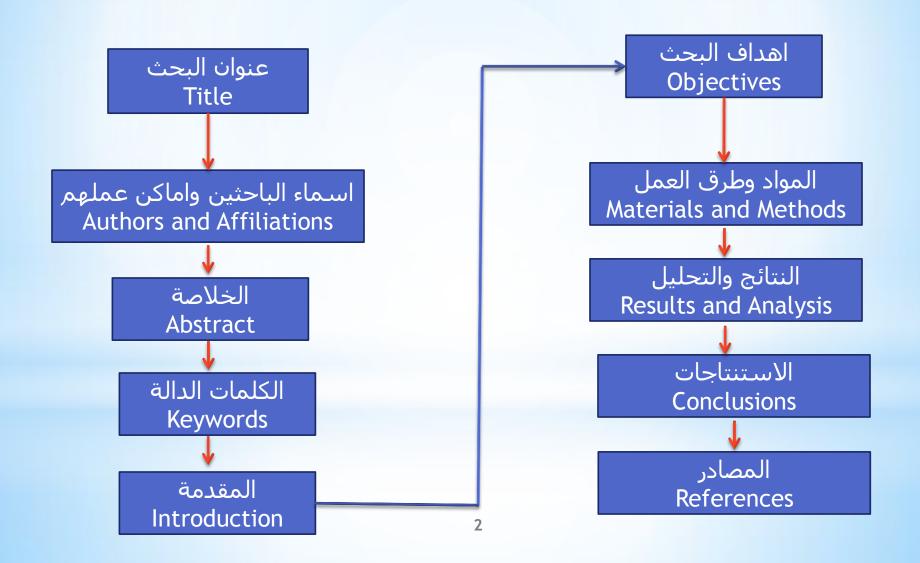
## (نشر البحوث في المجلات الرصينة والفرق بينها وبين المجلات المفترسة)

من اعداد

ا.م.د. آرام محمد رحیم

عضو لجنة الرصانة العلمية في رئاسة جامعة كركوك

## مكونات البحث حسب مقاييس المجلات العالمية الرصينة



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## Insulation materials for the building sector: A review and comparative analysis



S. Schiavoni<sup>a</sup>, F. D'Alessandro<sup>a,b</sup>, F. Bianchi<sup>a</sup>, F. Asdrubali<sup>a,c,\*</sup>

اسماء الباحثين

عنوان البحث

اماكن عمل الباحثين

a CIRIAF-Inter University Research Centre for Environment and Pollution "Mauro Felli", University of Perugia, via G. Duranei 67, 06125 Perugia, Italy

b Department of Civil and Environmental Engineering, University of Perugia, via G. Duranti 93, 06125 Perugia, Italy

<sup>&</sup>lt;sup>c</sup> Department of Engineering, University of Rome Tre via V. Volterra 62, 00146 Rome, Italy

## معلومات تقديم وقبول البحث



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#### ABSTRACT

The energy consumption of a building is strongly dependent on the characteristics of its envelope. The thermal performance of external walls represents a key factor to increase the energy efficiency of the construction sector and to reduce greenhouse gases emissions. Thermal insulation is undoubtedly one of the best ways to reduce the energy consumption due to both winter heating and summer cooling. Insulation materials play an important role in this scenario since the selection of the correct material, its thickness and its position, allow to obtain good indoor thermal comfort conditions and adequate energy savings. Thermal properties are extremely important, but they are not the only ones to be considered when designing a building envelope: sound insulation, resistance to fire, water vapor permeability and impact on the environment and on human health need to be carefully assessed too.

The purpose of the paper is to provide a review of the main commercialized insulation materials (conventional, alternative and advanced) for the building sector through a holistic and multidisciplinary approach, considering thermal properties, acoustic properties, reaction to fire and water vapor resistance; environmental issues were also taken into account by means of Life Cycle Assessment approach. A comparative analysis was performed, considering also unconventional insulation materials that are not yet present in the market. Finally a case study was conducted evaluating both thermal transmittance and dynamic thermal properties of one lightweight and three heavyweight walls, with different types of insulating materials and ways of installation (external, internal or cavity insulation).

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#### 1. Introduction

In the last decades the attention towards energy and environmental issues has grown exponentially and many international and national policies have been developed in order to guarantee a more sustainable future to the planet. Within this context, the European Union [1] paid particular attention to the building sector, since it is responsible for 40% of the total energy consumption in Europe. Furthermore, the unrealized energy efficiency potentials in the building sector are enormous and the massive adoption of energy savings measures in this sector could represent a solution for a strong

### 2. Objective

الهدف

The overall objective of this study was to develop a new fluid loss model to predict the short-term and long-term characteristics of the filter cake under high pressure and high temperature conditions. The specific objectives were as follows: (1) develop a new fluid loss model to represent the changes in the filter cake formation with the time, and (2) compare the new fluid loss model predictions from the current study and the literature with the API model.

المواد و طرق العمل

#### 3. Materials and methods

The standard API filter press test has a cross-sectional area of 45 cm<sup>2</sup> while the area for the HPHT filter press was 22.58 cm<sup>2</sup>. In the HPHT test, 2% and 8% bentonite drilling mud were used and tested at a pressure of 100 psi (689.5 kPa) and temperature of 100 °C. The tests were continued till near zero fluid loss, about 420 min (7 hrs).

## النتائج والمناقشة

#### Results and discussion

In order to verify the prediction of the new Hyperbolic model th the API model, experimental results were divided into two

الاستنتاحات

#### Conclusions

In this study, a new proposed hyperbolic veloped to take into account the changes ke thickness, permeability, solid content idy, 2% and 8% bentonite drilling muds sults were used to verify the static and hyption for short and long term fluid losses. All data from the literature were used to ver the model predictions of experimental in polygions are advanced:

Acknowledgements

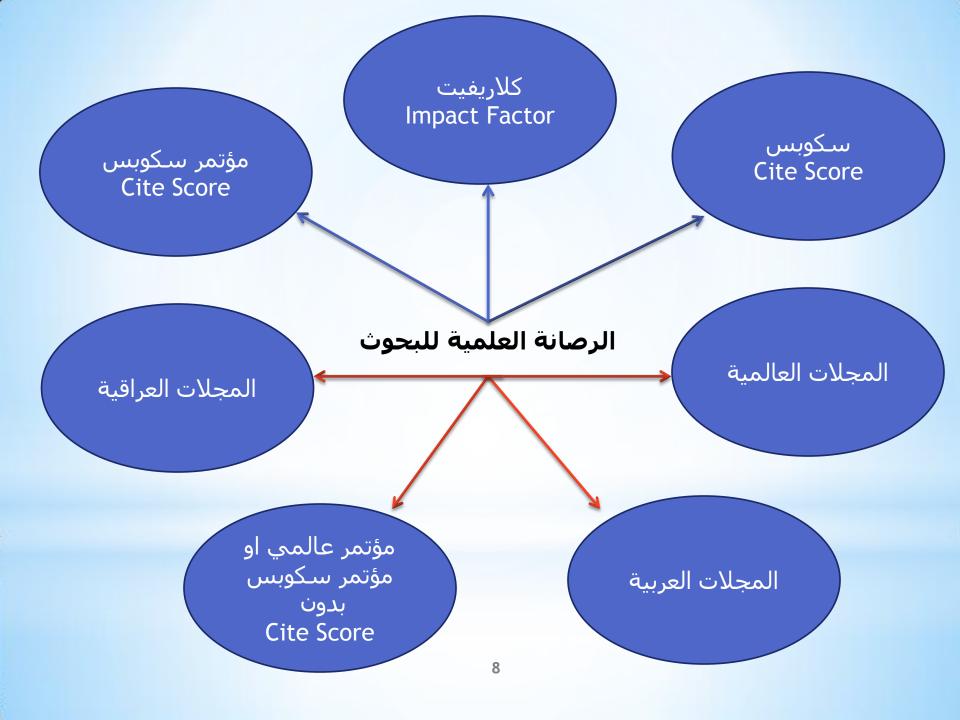
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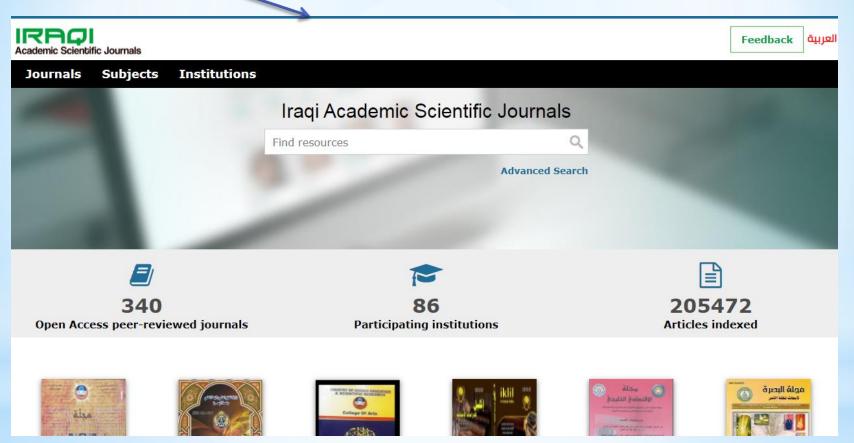
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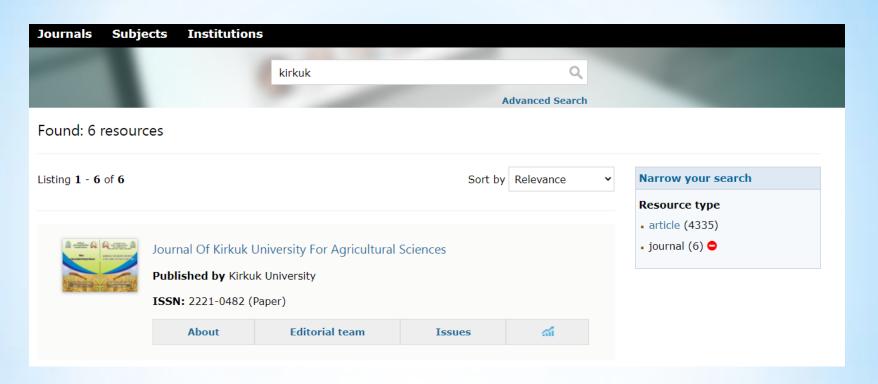
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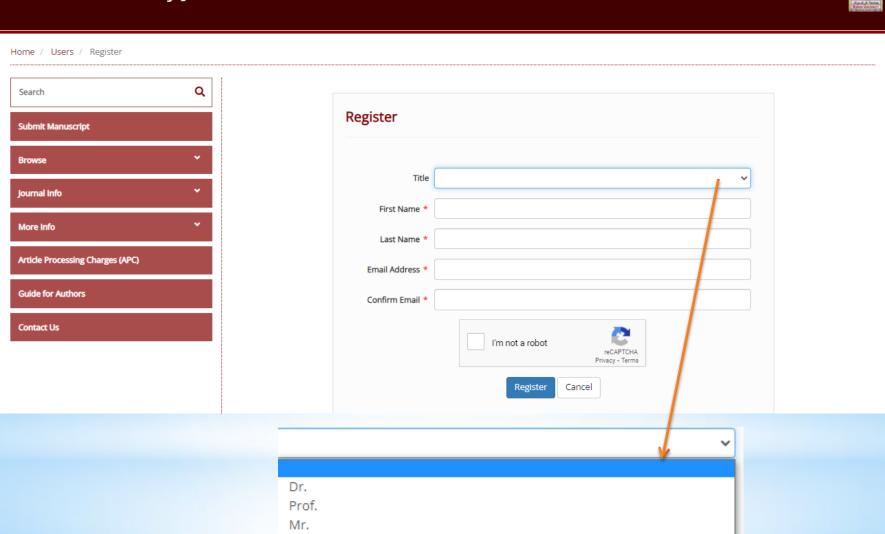
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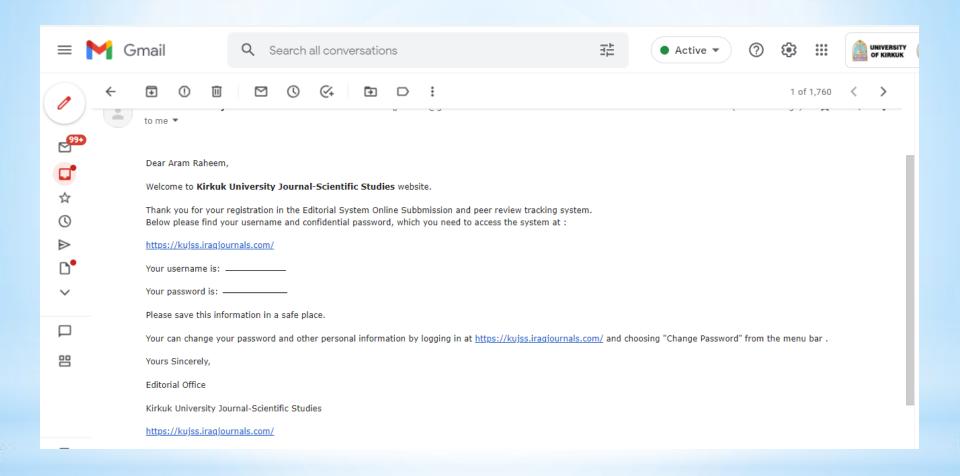


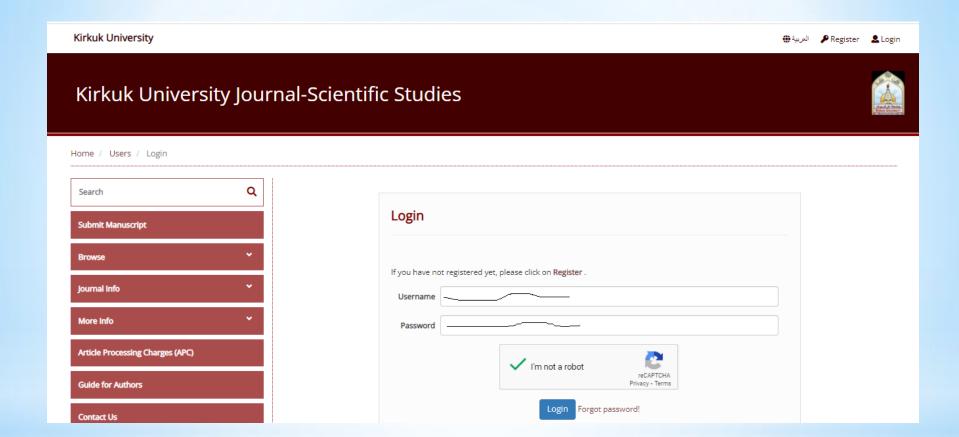
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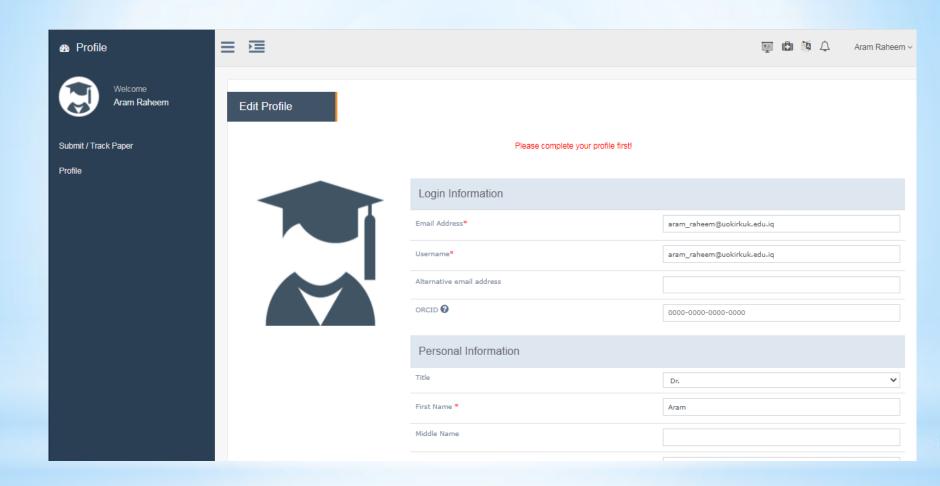




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The References to literature should be numbered in brackets [Bold] consecutively in the text in according to Vancouver style.

#### Examples

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Authors, "Book Title", Edition, Publisher, Country (Year).

[1] P. Ring and P. Schuck, "The Nuclear Many-Body Problem", 1st Edition., Springer-Verlag, New York (1980).

Note: Authors Name: from first to last name (sure name).

#### Journal Paper

Authors, "Paper Title", Journal Name, volume (issue), page (Year).

[1] Ali H. Taqi, R. A. Radhi and Adil M. Hussein, "Electroexitation of Low-Lying Particle-Hole RPA States of <sup>16</sup>O with WBP Interaction", Communication Theoretical Physics, 62(6), 839 (2014).

#### Conference Paper

Authors, "Paper Title", Conference, Country, Publisher, volume, page (Year).

[1] Ali H. Taqi and Sarah S. Darwesh, "Charge-Changing Particle-Hole Excitation of <sup>16</sup>N and <sup>16</sup>F Nuclei", 3<sup>rd</sup> International Advances in Applied Physics and Materials Science Congress, Turkey, AIP Conf. Proc., 1569, 27 (2013).

#### PhD or MSc thesis

Author, "Thesis Title", PhD Thesis, University, Country (Year).

[1] R. A. Radhi, "Calculations of Elastic and Inelastic Electron Scattering in Light Nuclei with Shell-Model Wave Functions", PhD Thesis, Michigan state University, USA (1983).

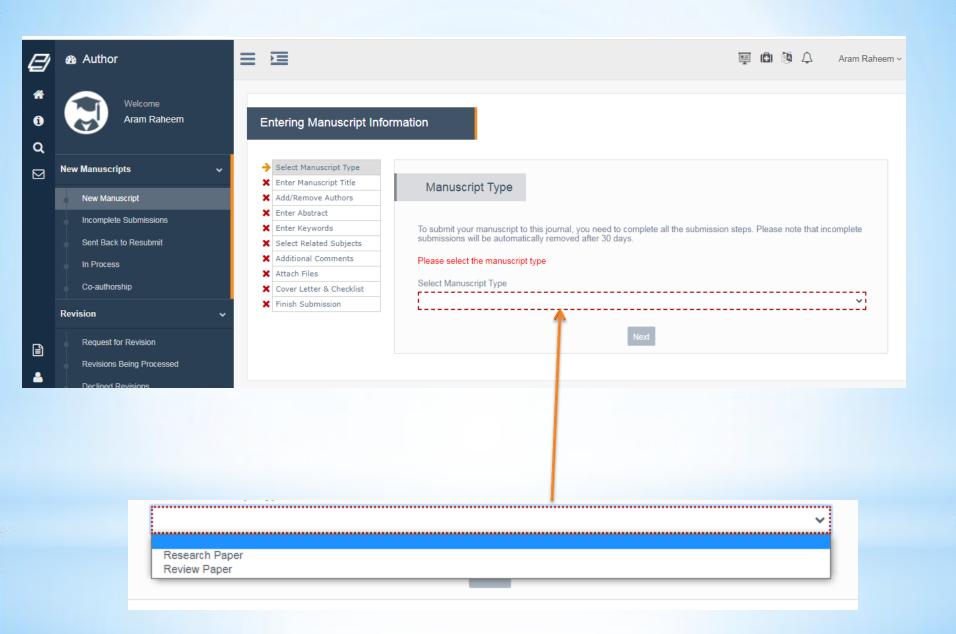
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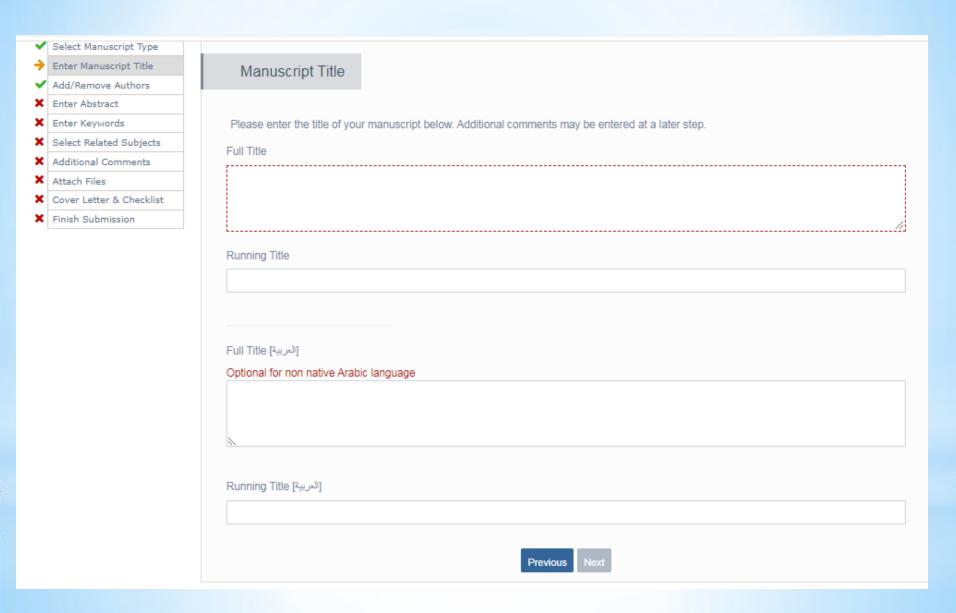
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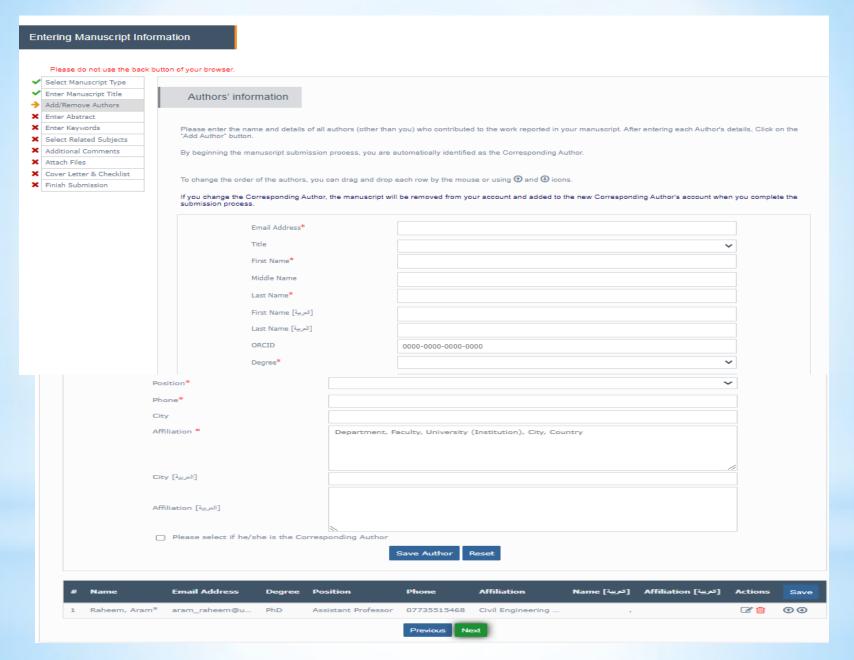
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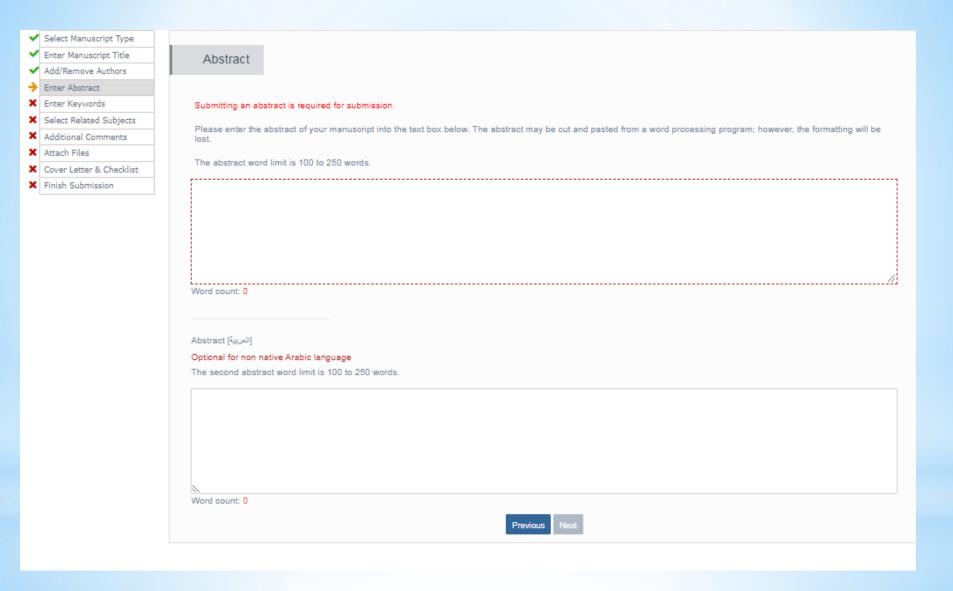
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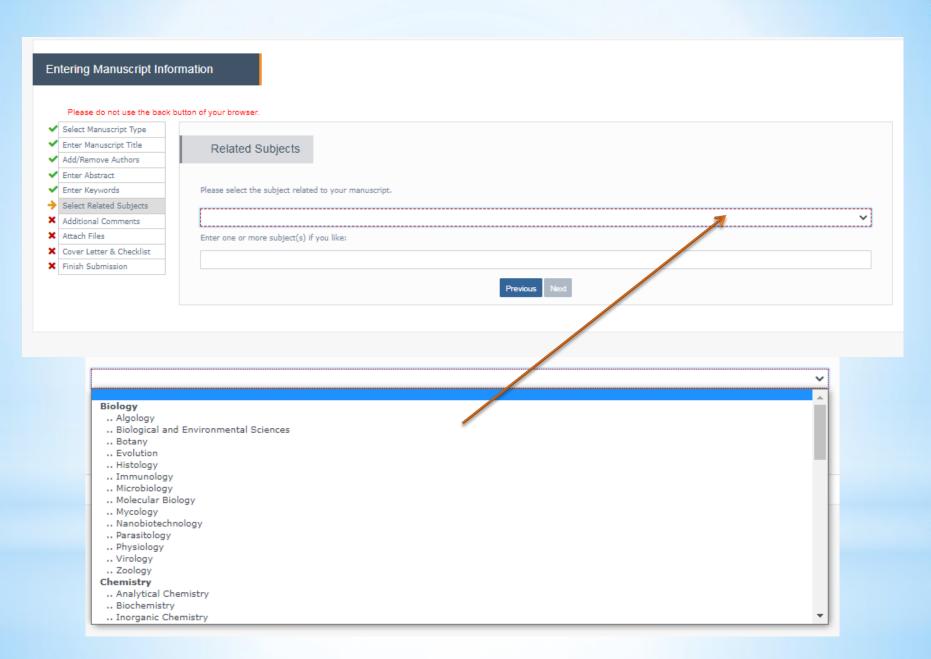


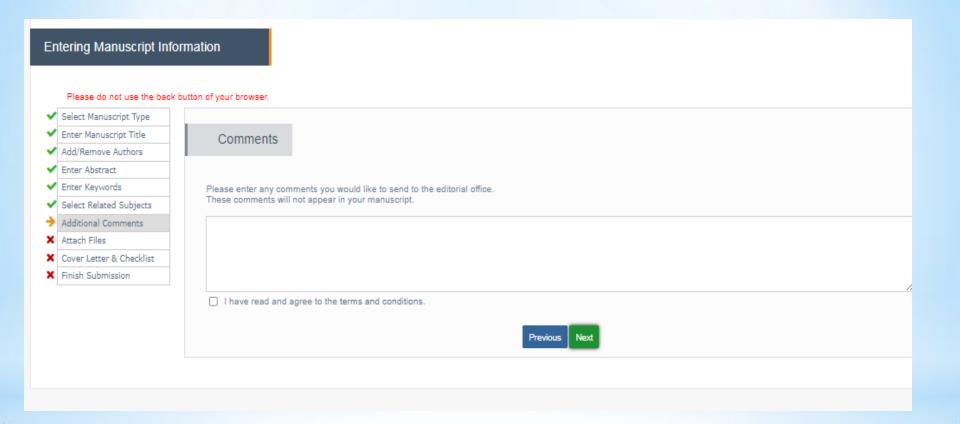


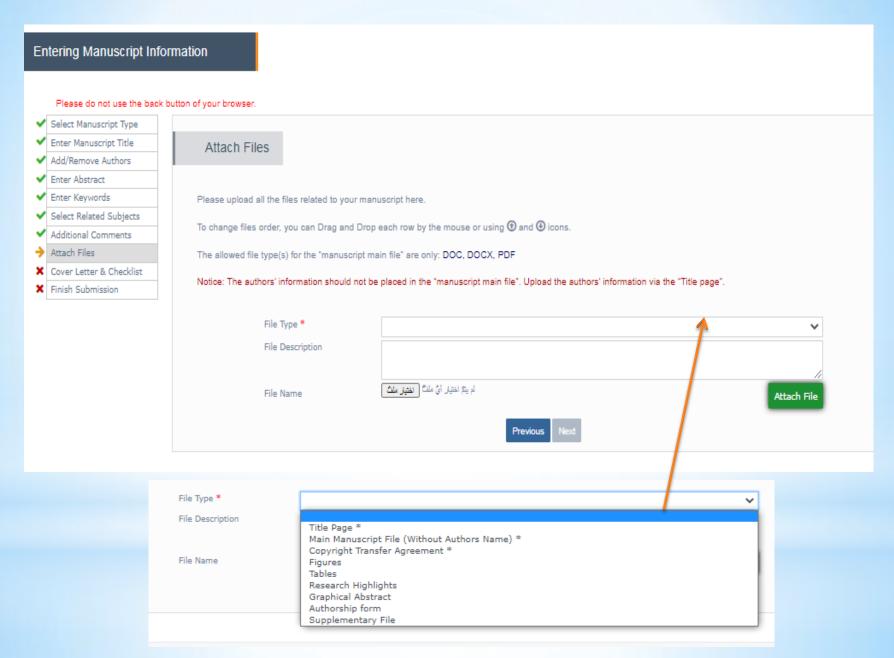


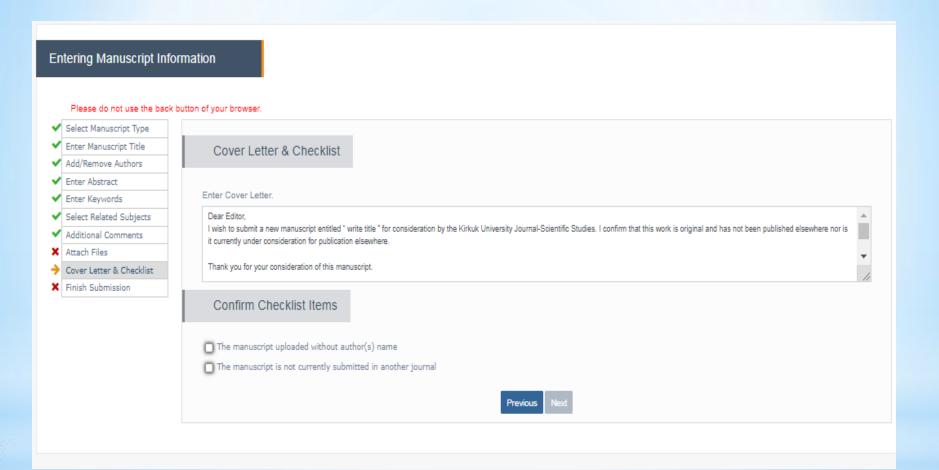


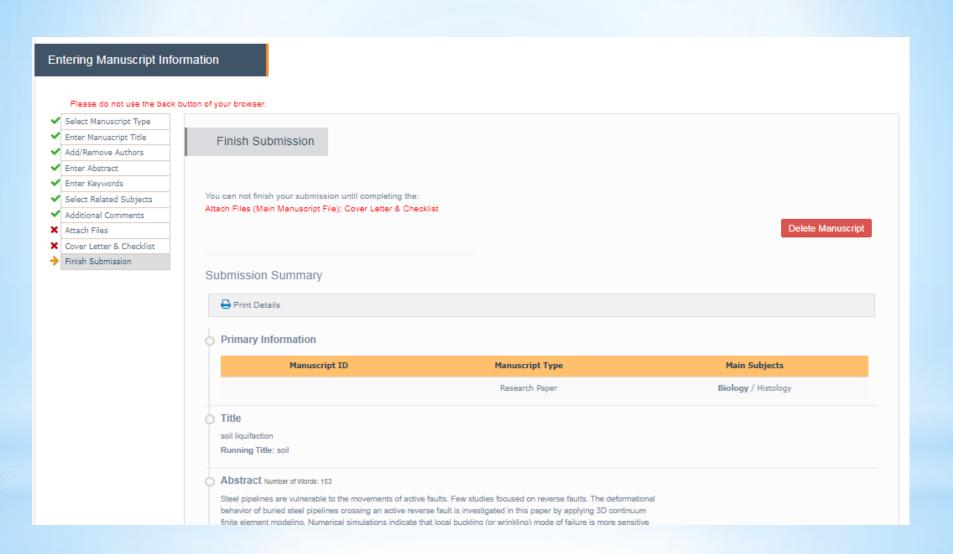
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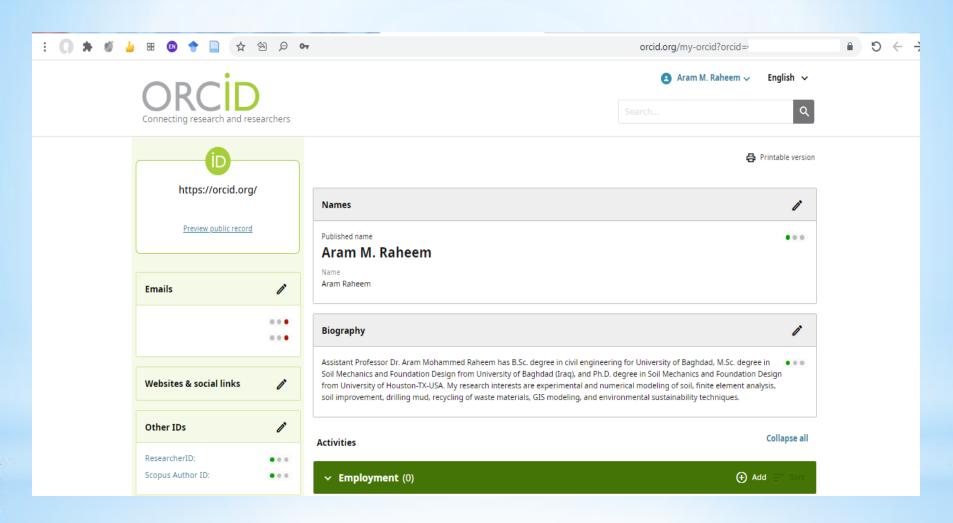


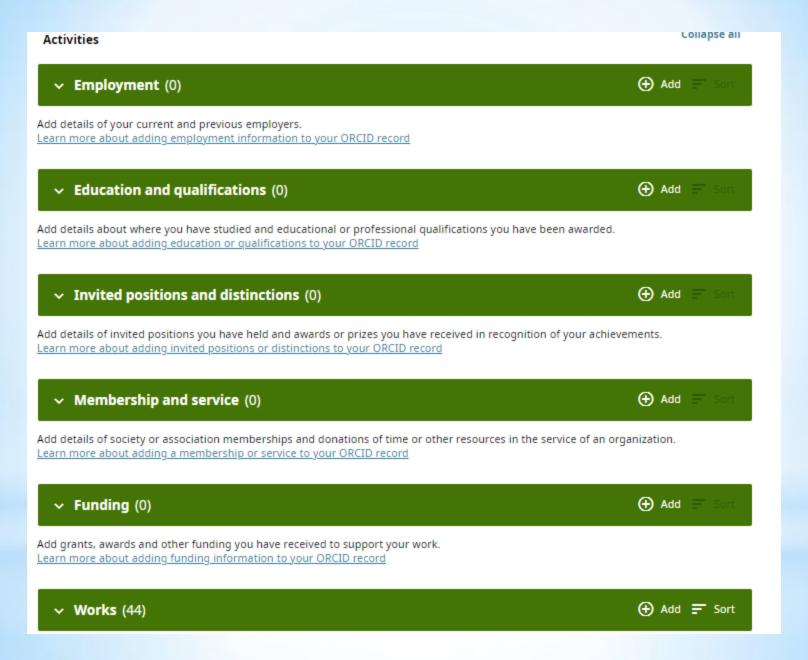






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