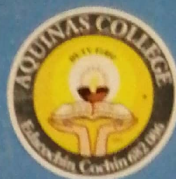


# Current Trends in Material Science



**Proceedings of UGC Sponsored National Seminar**

13<sup>th</sup> & 14<sup>th</sup> August 2014



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# Current Trends in Material Science

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\*Corresponding author e-mail address: jorphincmet@rediffmail.com

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<sup>2)</sup> Department of Physics, University of Calicut, Kerala 673 635.

<sup>3)</sup> Department of Chemistry, National Institute of Technology, Calicut

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<sup>a</sup>International School of Photonics, Cochin University of Science and Technology, Kochi  
 682022, Kerala, India  
<sup>b</sup>Department of Applied Chemistry, Cochin University of Science and Technology, Kochi  
 682022, Kerala, India  
<sup>c</sup>Department of Chemistry NSS college, Nemmara, Palakkad 678508, Kerala, India  
<sup>d</sup>J.C Bose Centre for Research and Advanced Studies, Toc H Institute of Science &  
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<sup>2</sup>Department of Physics, Pazhassi Raja N.S.S. College, Mattannur, India-670702  
<sup>3</sup>School of Pure and Applied Physics, Department of Physics, Kannur University,  
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<sup>a</sup>International School of Photonics, Cochin University of Science and Technology, Kochi  
 682022, Kerala, India  
<sup>b</sup>Department of Physics, Aquinas College, Ecdaochi, 682010, Kerala, India

# Synthesis and Evaluation of Mechanical Properties of Rice Husk Silica/ High Density Polyethylene Composite

Midhun Dominic C.D <sup>#1</sup>, P.M Sabura Begum <sup>#2</sup>, Rani Joseph <sup>#3</sup>

#1 Sacred Heart College, Thevara, Kochi-682013, Kerala, India, midhundominic@shcollege.ac.in

#2 Department of Applied Chemistry, CUSAT, Kochi-682022, India, pmsabura@cusat.ac.in

#3 Department of Polymer Science and Rubber Technology, CUSAT, Kochi-682022, Kerala, India, rani@cusat.ac.in

## ABSTRACT

Composites derived from renewable energy sources are assuming increasing importance nowadays. This article highlights the potential of rice husk silica as reinforcing filler in high density polyethylene (HDPE). Rice husk silica (RHS) with high degree of purity was obtained by the calcination of citric acid leached rice husk at 650<sup>0</sup>C for 6 hours. The synthesized rice husk silica was characterized by FTIR, XRD, SEM, EDX, TEM, BET surface area etc. Different analysis suggest that citric acid leaching of rice husk removes the metallic impurities present in rice husk and the synthesized silica (RHS) has got higher surface area, lower particle size and high purity. The mechanical properties like tensile strength and young's modulus of HDPE-RHS composite were superior to that of base polymer. Significant enhancements in the mechanical properties were achieved by the incorporation of RHS to HDPE without any surface modification.

**Keywords:** composite, rice husk silica, surface modification, Young's modulus

## INTRODUCTION

Paddy cultivation is a part of the proud culture of Kerala state. Rice husk, which is considered as an agricultural waste from paddy field, is a major source of amorphous silica [1]. Burning of rice husk will results in the formation of rice husk ash (RHA), which contain more than 90% of silica [2]. RHA contains metallic impurities like Na, K, Ca etc. other than silica [3]. Acid leaching of rice husk prior to calcination is an efficient method to synthesize silica with high degree of purity [4-7]. Pure Silica was synthesized from potassium permanganate treated rice husk [8]. The silica in the ash undergoes structural transformations depending on the conditions of combustion such as time and temperature [9].

HDPE the world's largest volume using thermoplastic finds wide use in packaging, cable insulation etc. Tensile and flexural strength of HDPE can be significantly enhanced by the addition of fly ash [10]. Rice husk has effectively delayed the thermo-oxidation process of