

**Department of Chemistry, IIT Madras**  
**PhD. Seminar – I (Research Proposal Seminar)**

**Metal-rubber interface in radial tyres: Fundamental studies**

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Date : 02. 12. 2019

Venue: CB 310

Time : 3:00 – 4:00 pm

**Abstract**

Radial tyres are the preferred tyres by automobile manufacturers and riders because of their long service life, increased vehicle fuel efficiency and comfortable ride. Brass-coated steel cords are used in radial tyres as the main reinforcing materials.<sup>1</sup> Brass coating is considered as the bonding agent which facilitates the formation of an interface. Brass reacts with the sulfur containing species in the cis-polyisoprene rubber matrix to form a complex interface consisting mainly of copper sulphides (CuS/Cu<sub>2-x</sub>S) interface. This interface helps in mechanical interlocking of the rubber resulting in a good adhesion. Rubber penetrates into the CuS/Cu<sub>2-x</sub>S nanostructures, giving a very firm interlocking rubber network adhered tightly with the interface.<sup>2</sup> For better performance of tyres, factors such as thickness, morphology and crystallinity of the CuS/Cu<sub>2-x</sub>S need to be tuned to increase the adhesion strength between brass and rubber.<sup>3</sup> This seminar gives an overview of prominent advances in imaging the interface in addition to the varied spectroscopic techniques used for understanding brass-rubber interface. The study also gives a summary of the computational studies to comprehend the interaction energies between copper sulphides and cis-polyisoprene.

**References**

1. Patil, P. Y. *et al.*, *Rubber Chem Technol.* **2006**, 79 (1), 82-93.
2. Kim, J. M. *et al.*, *J Adhes Sci Technol.* **2003**, 17 (2), 165-178.
3. Fulton, W. S. *et al.*, *Appl Surf Sci.* **2004**, 221 (1), 69-86.

Guide

Co-guide

Seminar coordinator

  
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