

**DEVELOPMENT OF NATURAL RUBBER BASED
COMPOUNDS FOR MANUFACTURE OF ABRASION
RESISTANT GLOVES**

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Degree of Master of Science

Department of Chemical and Process Engineering

University of Moratuwa

Sri Lanka

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Thesis submitted in partial fulfillment of the requirements for the degree Master of
Science in Polymer Technology

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DECLARATION

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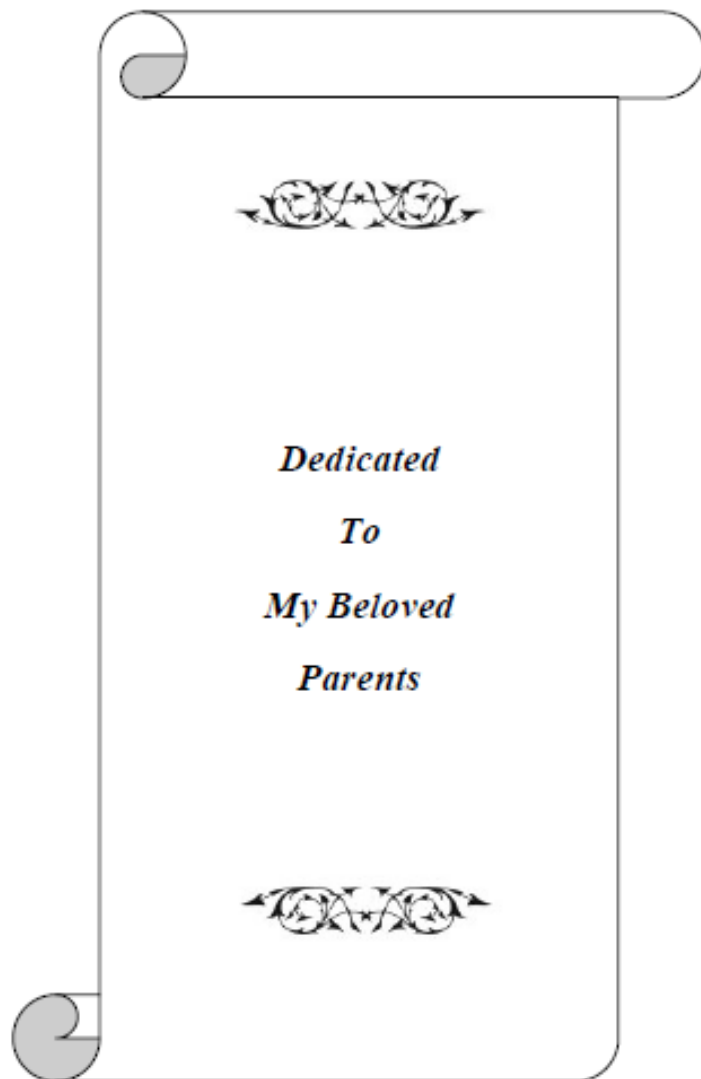
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The above candidate has carried out research for Master's thesis under my supervision.

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DEDICATION



ACKNOWLEDGEMENT

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ABSTRACT

Key words: Abrasion resistance, Fume silica, Silane Coupling agent

Industrial glove industry is a glooming industry which focuses performance enhancement with lowest possible cost. Abrasion resistance is one of the main performance indicators of an industrial glove. Abrasion resistance was improved in the study using reinforcing filler material and a coupling agent with a minimum cost.

Surfynol was selected as the best dispersion agent to couple with fume silica and precipitated silica from a range of dispersion agents. Both silica materials were optimized for loading level and fume silica was selected as the filler with most abrasion resistance. The optimized loading level for fume silica was 7 parts per hundred rubber. Silane was used as the coupling agent for the semi-reinforcing filler material and it was optimized as 0.5 parts per hundred rubber for the best abrasion performance.

The samples were tested and validated for abrasion resistance, tensile strength, cut resistance, tear resistance, puncture resistance, stiffness, grip and aging. Microscopic view of fume silica loaded glove sample was compared with that of calcium carbonate loaded glove sample and validated for subject of uniformity of coating layers.

Abrasion resistance was improved by using reinforcing filler fume silica instead of non-reinforcing filler calcium carbonate. Silane was used as the coupling agent and it was optimized for the best abrasion performance. This newly developed receipt helped to improve the abrasion resistance by 6 times compared to traditionally manufactured gloves out of natural rubber latex filled with non-reinforcing filler calcium carbonate.

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LIST OF ABBREVIATION

BOM- Bill of Material

DRC- Dry Rubber Content

EN- European Norms

ERP- Enterprise Resource Planning

MST- Mechanical Stability Time

PPE- Personal Protective Equipment

PVC- Polyvinyl Chloride

TSC- Total Solid Content

TSI- Toluene Swelling Index

VFA- Volatile Fatty Acid