

Asphaltene Reinforced Polymer Composites



THE INVENTION

The patented invention is a method of using asphaltene, a by-product of crude oil refining, as a filler for producing polystyrene (PS) and polymethylmethacrylate (PMMA) composite materials.

MARKET NEED

Asphaltene is known to lower quality of petroleum products, clog well formations and flow lines, and is a concern for refiners. The oil and gas industry has expressed a need for technologies to increase the value and provide a more environmentally friendly end application for asphaltene byproducts¹.

On other hand there is a need for reinforcement / filler for polymer composites to achieve good combination of mechanical strength, viscoelastic properties and thermal stability in addition to cost reduction and improved processing characteristics.

²Global PMMA market is expected to reach USD 10.87 billion by 2020. ³Whereas polystyrene market is estimated to be USD 13.2 billion in 2015 and is projected to register a CAGR of about 6.03% between 2015 and 2020.

¹ *Petroleum Technology Alliance of Canada (PTAC) 2012*

² *Grand View Research*

³ *PR Newswire, 2015*

APPLICATIONS

Possible applications for the asphaltene polymer composites are any application where these polymers are currently used:

- PS is used in building industry, packaging industry, retail industry, and the food industry wrappers (plastic bags, squeeze bottles, toys, CDs, test tubes etc.)
- PMMA is known as acrylic glass and its applications include implantable medical devices, washbasins and kitchen countertops for home, light guide sheets, automotive, electronics etc.

ADVANTAGES

- Offers new application for the asphaltene which is considered as menace in oil field
- Composites have higher mechanical strength, viscoelasticity and thermal stability compared to pure polymer.
- Cost effective filler as asphaltenes are undesirable material in petroleum matrix.

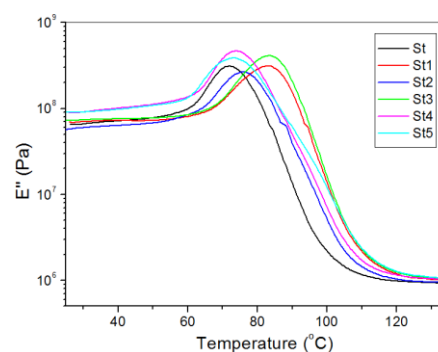


Fig: DMA scans of polystyrene composites showing loss modulus

PROJECT STATUS

Composites were prepared with a filler of asphaltene isolated from Arabian crude oil. Comparisons to pure polymer were performed at laboratory bench scale to show the advantages of the composites.

NEXT STEPS

Proving the concept by comparing the asphaltene composites with other PS or PMMA composites in market for specific applications.

KFUPM seeks an industry partner to develop the technology leading to commercial exploitation. Plastic producing companies in middle-east are welcome.

PATENT PROTECTION

Patent US9018285 cover the composition and method of making the composites. IP is owned by King Fahd University of Petroleum & Minerals (KFUPM).

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