Editorial corner – a personal view

Rice husk: Turning wastes into wealth

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In recent years, due to growing environmental awareness, agro-fillers have been increasingly used as fillers in polymer composites. In general, these organic fillers promise some advantages compared to traditional inorganic fillers, including their renewable nature, low density, nonabrasive properties and reasonable strength and stiffness. This makes them competitive as reinforcement in certain composite applications. One of the potential agro-filler for polymer composites is rice husk (RH). Every year about 50–100 million tons of husk residues were produced from world rice production. The disposal of RH wastes poses a growing problem due to the low bulk-density nature of the husks. Thus the utilization of RH as filler in polymer composite applications is alternative to alleviate problems related to the disposal of the waste husks. The composition of RH is 35% cellulose, 25% hemicellulose, 20% lignin and 17% ash (mainly 94% silica, SiO₂) by weight. The presence of SiO₂ provides at least two main advantages to RH i.e. processability and durability. RH has higher degradation and decomposition temperature ($\approx 250^{\circ}\text{C}$) compared with wood flour ($\approx 200^{\circ}\text{C}$) due to its relatively low lignin and hemicellulose contents. Therefore, the processing of RH composites can be performed up to 250°C . The use of 'natural composites' is often questioned for outdoor application. The durability study of composites can be classified into 3 main categories i.e. weathering, moisture absorption and biodegradation. As far as moisture absorption is concerned RH should behave better than wood composites due to its SiO₂ content. The high hydroxyl group content of cellulose is the main cause of poor compatibility between hydrophilic

natural fillers and hydrophobic polymers used as the matrix. The most effective and economical way to improve the fiber-matrix interfacial adhesion of RH filled polymer composites is by adding a compatibiliser/coupling agent.

In responding to the needs of developing environmentally friendly composites, considerable efforts are being undertaken to produce RH composites based on biodegradable polymer matrices such as poly(lactic acid), poly butylene succinate (PBS), etc. It would be interesting to investigate how the presence of SiO₂ in RH would affect the durability in general and the biodegradability in particular, of those polymers.

Although RH composites are finding wider acceptance to be used in various applications, researches are still ongoing to improve the overall performances of the composites. Issues such as lack of established delivery channels i.e. transportation of RH from various rice mills to the RH processing plant, processing complications due to the low density and hygroscopicity of RH are limiting the wider scope of application of RH. The development of new polymer additives and processing technology must be intensified in order produce high quality RH composite products.

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