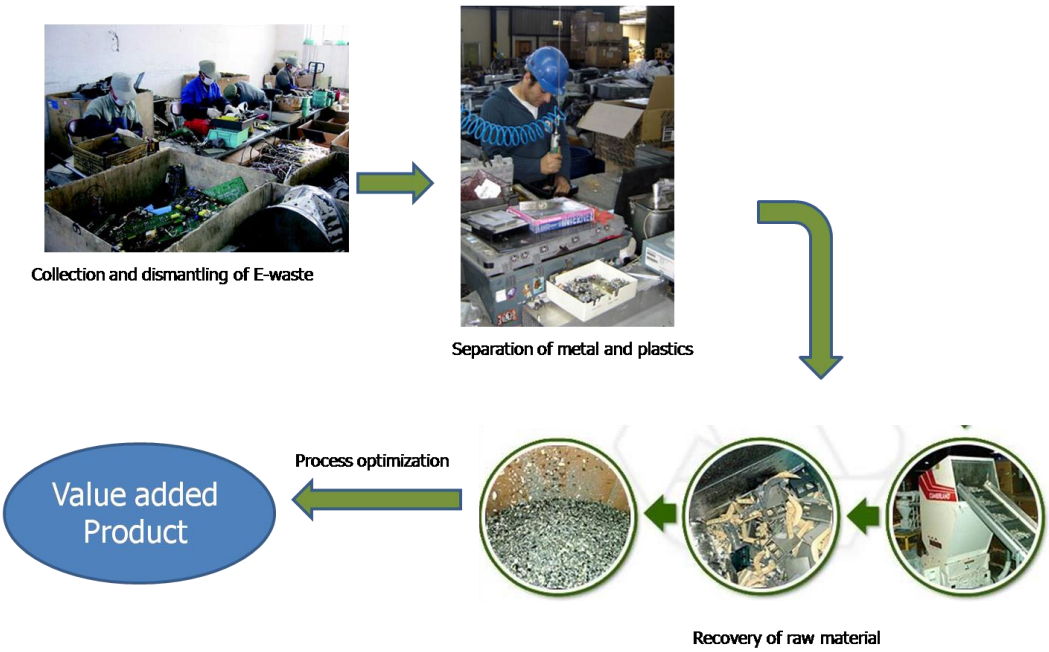
Invitation for Expression of Interest
On
Conversion of large scale Plastics waste from WEEE to value added products

A new cost saving recycling material combining benefits of both strength and toughness with flowability

1. Project Background:

WEEE referred to as the waste generated from waste electrical & electronic equipments is among the fastest growing waste stream. WEEE constitutes of various valuable metals like gold, copper, palladium as well as very high grade engineering plastics. The plastics comprising of 30-40% in the waste stream are often ignored and are considered as a non-valuable resource as compared with the metals being recovered. The valuable fractions are processed to directly reusable components and to secondary raw materials in a variety of refining and conditioning processes. All the work is done by bare hands and only with the help of hammers and screwdrivers. Children and women are routinely involved in the operations. Waste components which does not have any resale or reuse value are openly burnt or disposed off in open dumps. Pollution problems associated with such backyard smelting using crude processes results fugitive emissions and slag containing heavy metals of health concern.

Laboratory for Advanced Research in Polymeric Materials (LARPM), R&D wing of CIPET located at Bhubaneswar has developed an eco-friendly viable technology towards streamlining of segregation methodology, categorization of Plastics waste to value added products for commercial exploitation.



The laboratory has also devised 04 grades of formulations utilizing plastics part collected from E-Waste like: ***High Impact grade, improved Flow Grade, FR grade and improved Impact with Better flow grade*** which have been validated for many high end applications with reduction in cost & improved process parameters as well. Several prototypes as proof-of-concept been developed using injection molding machine. The material showed better repeatability and dimensional stability meeting the requisite properties in accordance with IS 14772 & IS 14434 (2000) suitable for electrical application and other high end application.

A detailed cost evaluation was also done which showed around 60-70% reduction in cost of a single product in the case of recycled products as compared to the virgin one. The optimized formulations/ master batch were also subjected to life cycle analysis in an accelerated weathering condition and repeated reprocessing cycles to access the end-of-life of the components. The results show that the developed formulation is stable to nearly 5-10 years in normal environmental conditions can be easily reprocessed at least two to three times without any appreciable change in its mechanical performance or durability.

Bhubaneswar is the only Tier-2 Smart city in the country to host the top five Indian IT companies: Infosys, Wipro, Tata Consultancy Services, Tech Mahindra and Mindtree. Being the capital and smart city of Odisha, Bhubaneswar has huge potential for generating employment opportunity and resource recovery by establishing E-waste recycling unit. Taking view of above aspect the laboratory has established a demo-recycling unit in the city of Bhubaneswar to support the technical knowhow for E-waste recycler.

2. Grades of Raw Materials

1. High Impact & low flow grade: Impact Strength : >200 J/m
   MFI: 4-6 g/10 min
   - *Suitable for Automotive and Electrical & Electronics application*
2. *Moderate - Impact & flow grade* *Impact Strength : > 150-200 J/m*
   MFI: 6-9 g/10 min
   - *Suitable for Furniture and house hold application*
3. *Low Impact & High flow grade* *Impact Strength : >100-150 J/m*
   MFI: >10 g/10 min
   - *Suitable for Decorative items and integrated design products*
4. FR grade *Hardness: > 50-80 Shore A*
   Dart Impact: >10 J
   - *Suitable for Flooring application*

3. Glimpse of various products from WEEE:

Bottom part of Grinder

Armrest

Adaptor component

Automotive Blower

Bore well cap

Electronic base

Electronic Meter Cover

4. Patent filed by CIPET LARPM:

"A process for preparing recycled plastic materials from waste electrical & electronic equipment", [Application No.204/KOL/2014 dated: 18.02.2014]

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Docket NO : 1690
To
DR. SANJAY KUMAR NAYAK
CIPET, B/25, CNI COMPLEX, PATIA, BHUBANESWAR-751024

Date/Time : 18/02/2014
Agent Number:

Sr. No.	CBR Number	Reference Number /Application Type	Application Number	Title/Remarks	Amount Paid	Amount Computed
1	1599	ORDINARY APPLICATION Pages:-17 , Claims:-11	204/KOL/2014	A PROCESS FOR PREPARING ---------- EQUIPMENT.	1200	1200
2		E-2/347/2014-KOL	204/KOL/2014	Form2	0	0
Total Amount					1200	1200

Received a sum of Rs. 1200 (Rupees One Thousand Two Hundred only) as under

Payment Mode	Bank Name	Cheque/Draft Number	Cheque/Draft Date	Amount in Rs
Cash	---	---	---	1200

Note: This is electronically generated receipt hence no signature required.

5. The Technology

WEEE contains several engineering plastics of which PC, ABS, HIPS and blend of PC/ABS are most common. After the end of life, these engineering materials are found as waste materials, their higher mechanical performance and cost are being ignored. These materials can be used further with a proper technology, which includes systematic identification, segregation and melt blending with inclusion of appropriate additives.

The laboratory has developed a systematic approach for the recycling of WEEE products and developed value added formulation coded under Lapol grade developed from engineering Plastics as main composition along with appropriate amount of impact modifier and other additives. The developed material possesses equal combination of both strength and toughness with good flow ability. The product has the ability to consistently maintain its properties throughout the processing range even with the presence of different grades of polymeric materials. Also, as part of this work, the laboratory has technical data base that will support the industries for composition analysis. Simple and economic recycling has been successfully validated using different machine trials for high end application. The synergistic effect of improvement in materials, properties and its cost for processing exceed the current method of technology and related materials used in recent time.

6. Benefits

- Comparatively less cost (1/3rd of commercial engineering plastics)
- Total process involves economical and easier way with low skilled operator.
- Good combination of strength with toughness and improved flow ability for easy processing
- Improved toughness
- Recyclable
- Non hazardous and non-toxic
- Environmental friendly process

7. Options for commercialization

This technology is part of LARPM, CIPET's technology transfer program. The program seeks to stimulate the use of technology by commercial sector. The laboratory is flexible in its agreement, and opportunity exists through cooperative development.

If your company or organization is interested in this technology, please contact:

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PREPARATION AND SUBMISSION OF EOI

a. Language

The EOI and all related correspondence and documents should be written in the English language. Supporting documents and printed literature furnished by the Bidder with the EOI may be in any other language provided that they are accompanied by appropriate translations of the pertinent passages in the English language. Supporting materials, which are not translated into English, may not be considered. For the purpose of interpretation and evaluation of the EOI, the English language translation shall prevail. It should be noted that any document in foreign language, not accompanied by an English version and duly authenticated, will be liable for rejection.

b. Check List.

The EOI shall accompany the following:

1. Letter of Application duly signed by the Authorized person on the letterhead.
2. Details of Bidder along with the Incorporation and commencement of business certificate attested by the Authorized Person.
3. Photocopies Audited Balance Sheets and Profit and Loss statements, PAN Card etc
4. Resume of the Key Personnel

a. Short listing

CIPET shall evaluate the expression of interest for short listing, inter-alia, based on their past experience of handing similar types of projects, strength of Firms man power and financial strength of the firm. Preference would be given to vendors with expertise in handling plastics.

Last date for submission of EOI: March 31, 2018