

Greener Mobile Phones

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Abstract— In this era, where the development and advancement is going at a great pace and every now and then new gadgets appear in the market, it is very difficult to stick to the old ones. There is a great competition going on between all the mobile companies and they try their best to give new features to their mobile phone so that they get attracted and buy them. So a million dollar question is: what to do with the old mobile phones? Throw them? No, obviously not! Mobile phones have barium, lead, mercury, cadmium, chromium, selenium, antimony, PVC, bromine etc. in them. So when the mobile phones are disposed of then there is a possibility of leakage in their batteries. This will pollute the land and can also enter rivers and becoming a great danger for human life. Aquatic life may also be disturbed. So it is very necessary to plan for a “Greener Mobile Phone” which will be able to reduce its toxicity to some extent.

Keywords: Mobile Phone Usage, Gallium Nitride (GaN), Greener Mobile Phone

I. INTRODUCTION

A. Mobile Phone Usage

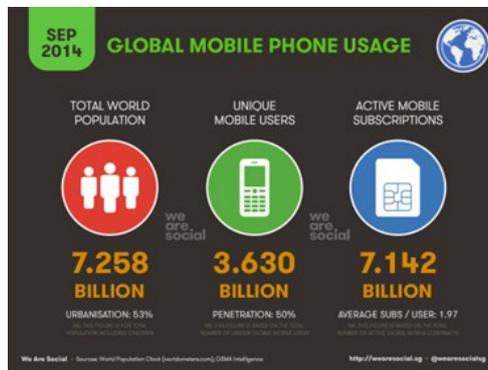


Fig. 1: Mobile Phone Usage

The number of unique mobile phone users around the world has just passed 50% of the world’s total population. The usage figures – provided by GSMA Intelligence – suggest that 100 million more people started using a mobile device since April of this year. [1]

To put those figures in context, that’s more than 750,000 new mobile users every day – or 9 new users every second. But in addition to this, every minute people are dumping their previous ones. I mean it’s obvious, who would like to use his older mobile phone as soon as he purchases a new one.

Which is leading to a great misery which we are failing to realize right now, which is going to suffer for the rest of our lives.



Fig. 2: clip art of Mobile phone

Let’s first talk about our place only. The latest study titled “E-Waste in India by 2015” revealed that the Delhi-NCR region would be generating an estimated 50,000 metric tonnes of electronic waste per annum by 2015, as compared to the current 30,000 metric tonnes. The Study further found that Delhi alone receives about 85% of the E-Waste generated in developed countries. Currently, in terms of the total amount of electronic waste generated internally as well as e-waste sourced externally for processing, Delhi’s e-waste stands between 25,000-30,000 metric tonnes annually.[2][3] Hence, we can say that in addition to myriad attractive features, mobile phones too contain various toxic chemicals and elements which are capable of causing us severe damage.

B. Harmful Substances in Mobile Phones

- 1) The Printed Circuit Board (PCB) contains hazardous substances arsenic (in chips made from gallium arsenide), antimony, beryllium, brominated flame retardants, nickel, palladium, silver, tantalum and zinc. The lead and

brominated flame retardants have the highest environmental impact due to their levels of toxicity and persistence in the environment.[4][5]

- The Plastic Casing of the phone is usually made of polycarbonate (PC), Acrylonitrile Butadiene Styrene (ABS), or a combination of the two. These plastics are difficult to recycle and often contain Brominated Flame Retardants (BFRs), to reduce the risk of fire. But, BFRs are damaging to the environment and human health as they are persistent, bio accumulative and toxic.[4][5]

II. MATERIALS AND METHODS

So, in an attempt to conserve ecosystem from harmful effects of these chemicals, I did research and came up with some elements and polymers which are capable of standing up to the mark as their former replacements without any compromise in their efficiency and functioning:

A. Gallium Nitride (GaN)

GaN offers exceptional power density. It can operate at a higher power level at higher frequencies, and it offers higher efficiency. Therefore keeping in mind, the toxic effects of Arsenic on human health and environment plus cost factor, Gallium Nitride can be proved to be a good replacement for Gallium Arsenide.[6]

B. DynaSil (Tetraethyl Orthosilicate)

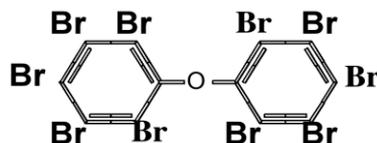
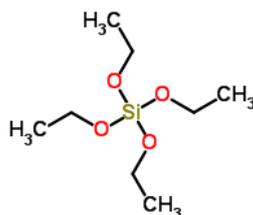


Fig. 3: DynaSil (Tetraethyl Orthosilicate)

As discussed earlier, exposure to Antimony and BFRs lead to pneumoconiosis, altered electrocardiograms, and stomach ulcers and toxicates environment and surrounding on dumping. There's an urgent need to first replace them with a substance at least lesser toxic than them.[7][11]



Tetraethyl Orthosilicate

Fig. 4: Tetraethyl orthosilicate

Brominated Flame Retardant (BFR) And it is where DynaSil comes into picture, DynaSil uniquely allows traditional halogen and non-halogen flame retardants to work more effectively. A slight addition of DynaSil allows for reduction in heat release rate, a decrease in smoke generation, elimination or minimization of traditional hazardous flame retarding chemistries. This in a way negotiates the use of Brominated Flame Retardants (BFRs) and Antimony in manufacturing of PCBs for mobile phones anymore. [8]

C. Kydex (Polymer)

Though Acrylonitrile Butadiene Styrene (ABS) have been proved to be one of the best partners when it comes to making of plastic materials. But Kydex is lower in cost, higher in tensile strength, tougher, more electrically insulated and is more chemically resistant than ABS. This thus, makes it way better to be used for Plastic Casing. [9][10]

III. CONCLUSION AND FUTURE SCOPE

The attempt of reducing harmful effects of disposal of mobile phones, resulted with the replacement of three toxic materials out of ten (referring to the paper) by a lesser toxic material. This may not look like a great number right now, but actually can make huge difference if applied at a large scale. But before that, these alterations need to go through a pilot stage, in order to observe differences in mobile phone's efficiency(if any).

Secondly, talking about the future of Green Mobile Phones. They are one of the best ways to welcome forthcoming advancements in technology with a green signal by the environment. Because, being the new generation inventors we need to keep our environment in the top priorities list while making a new invention or innovation.

IV. DISCUSSION

There are some other metals and chemicals present in mobile phones like Mercury used in LCDs, Lead used in PCBs, and other heavy metals and hazardous materials used in Antenna, Speaker, Microphone, Keypad, Accessories. These materials are still needed to be overtaken by some other ones who are efficient plus eco-friendly.

Hence, we can say that there's still a long way to go.

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