

AIR-INK : THE WORLD'S FIRST INK MADE OUT FROM AIR POLLUTION.

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Abstract:-

To transfer the microscopic particulate matter (known as PM 2.5) in machinery exhaust resulting from burning fossil fuels-what we might call soot –into black ink. Whether from cars and trucks or generators and factories , what have been inhaled by millions or contaminated water and soil, can now be used for drawing and printing, carbon black, a by product of petroleum products, is normally used to produce ink ,as well as be a component in rubber, paints and plastics. Rather than burn new fossil fuels for ink production.

The black ink we use in our pens or in inkjet printers is essentially made from soot. The technical term for the substance is “ carbon black”, and it is the powder that remains after burning coal or oil. The powder is mixed with a polymer and a solvent to turn it into smooth, flowering black roller ball ink. “ so if you can do it with soots, can we do the same with air pollution?” The answer is that “ The black colour in the pen you use is made by burning fossil fuels to make ink. But you should not need to burn new fossil fuels just to make ink. Fossil fuels are already being burned.”

Key words:-

Air-Ink, Awareness, Carbon capture, Emissions, Environment, Fossil fuels, Industries, Markets, Negative, Pen, Pigments, pollutants, Pollution, Positive, Recycled.

Introduction:-

Air-Ink is a proprietary brand of ink and composites products made by condensing carbon –based gaseous effluents generated by air pollution due to incomplete combustion of fossil fuels. Air-Ink produces its materials through a step by step process which primarily involves capturing of emissions, separations of carbon from emissions, and then mixing of this carbon with different types of oils and solution to achieve advanced materials properties, It uses a patented device and technique called “KAALINK” to carry out of the filtration of soot, which contains carbon and other polluting agents like heavy metals and poly cycle aromatic hydrocarbon. Air-Ink is marketed as a solution to air pollution and its negative effects on human life, by allowing the print industry to off set its carbon. Dubbed as “The first ink made out of recycled air pollution”, its products were used in June 2016, in association with Heineken to create street art and murals in Hong Kong's Sheung Wan district. 30-50 minutes of car pollution can supply enough carbon to fill out Air-Ink pen.

Soot composed of 2-5 micrometer black carbon particles found in petrol or diesel carbon emissions is captured from the tailpipes of cars and diesel generators through a device called “KAALINK”.

A separate ensures that carbon particulate is recycled into safe inks without heavy metals /toxins.

A single Air-Ink pen contains 30-50 minutes of air pollution. The emissions from 2500 hours of driving one standard diesel vehicle produces about 150 litres of ink. Researchers explain there are seven different grades of Air-Ink, with different applications: Fabric, Outdoor paints, etc. Researchers process the captured pollution to remove the heavy metals and carcinogens but the inks used for art work/graffiti etc are not fit for inhalation /ingestion. This is similar for any other ink or paint. At the present time, Air –Inks and paints are being produced in different shades of grey and pitch black, and separate effort is being made to broaden by adding more varieties of inks and paints. Once researchers add printer cartridges refills to their portfolio, they shall be able to reduce the carbon – footprints in businesses /offices too. Researchers were confident on the commercial viability of their products and looking forward to commercial launch by the end of this year. The Air-Ink is not only reducing pollution, but it is also being used as a political campaign to increase awareness about the seriousness of pollution. In just 45 minutes of collection from an exhaust pipe, one whole pen can be filled. This really puts in perspective just how much pollutants is released into the air in a short period of time. In addition to perspective, the start up is creating murals using its own ink, adding to street art and in turn to culture.

Methods and materials:-

Researchers, the first commercial ink made entirely from air pollution. It started as a small proof of concept experiment using soot from air pollution to make paints, when it worked, team built a laboratory in a small garage in Bangalore to create a device that could capture air pollution at the source, in engines or factory machinery. In the six months they spent in India refining their technology. It was not hard to find pollution sources for experimenting. Researchers explain that in western countries, like the United States, stricter regulations already require companies to dispose of carbon particulates responsibly. However, in places like India where regulations are more relaxed, waste builds up quickly at small to medium-size businesses because it can be expensive to dispose without systems in place to get rid of the waste, plenty will end up in landfills or even rivers. Team put a call out to area factories asking for their carbon particulate, and it was not long before polluters started containing him to collect their waste.

Team developed a filtering device called “KAALINK” derived from the Hindi word “KAALA” meaning black, that was comprised of a steel cylinder that could be affixed to an exhaust. Now, kaalink can be scaled up to filter air pollution from just about any source, like a smokestack on small machinery or even straight out of the air, and turn it into soot, which is then hydrated to form ink that can be used in Air-Ink pens and markers. Each marker holds about 30 millilitres of Air-Ink, which is equivalent to approximately 45 minutes of diesel car pollution. The researchers realized that Air-Ink pens produced high-quality, long-lasting, deeply-pigmented non-toxic pigment using recycled material, work spread fast. Air-Ink will be displayed in the “salvage” section.

Artist Ellen Lupton, a senior curator at Cooper Hewitt, used Air-Ink markers to stencil part of the exhibition's message on reclaimed wood and other recycled material. She was surprised by the materials "super qualities" as an art products, nothing that the ink is super black, withstands prolonged use, holds up on "variety of surfaces and mediums, and would not be through paper or dry out quickly. " I was surprised at how functional the product is, it is an incredible nation that you can turn pollution into ink. I did not think it would be so fun to use. She says and makes you think if these particles are in the air and they are that pigmented, it is chilling.

As for researcher and Air-Ink, the focus is expansion to an industrial scale. The inventor would like Air-Ink to be used in practical applications, newsprint, textbooks, or textiles printing in the fashion industries. Researchers set up industries for their comfort, but the environment has to bear the price of it. Researchers explains, adding that Air-Ink is not silver bullet solution to the world's pollution problem. "It is a start, and it can inspire several others to start looking at new forms of waste that are lying outside unutilized.

Results and discussions:-

Air-Ink is a project born with a clear purpose : To fight against the evident fact of air pollution and contribute to a better environment, free of toxic waste. Air pollution, it is a reality that we are facing from some years back, Humankind has gone too far abusing of massive mechanisms that has produced large amounts of toxic pollutants and has become the single largest environmental and human health threat in the entire human's history. The engineer and developer of the project, experienced in first-hand the effects of air pollution, while he was walking in Mumbai in 2013 and his clothes got stained black due to the amounts of pollution in India's air. It was after that trip when came up with this creative and new idea of turning air pollution into ink. Graviky Labs is an award-winning clean technology company that has industrialized the process of recycling air pollution emissions into advanced pigments and inks. Graviky Labs current focus is to reinterpret the environment conversation through fusion of science, art and develop technologies which have net –positive impact on our environment.

Air pollution fact and figure

- 1700 deaths
Schools in approximately of unsafe air quality.
- 1.4 millions premature deaths a year in India linked with air pollution.
- 11 millions diesel cars/generators world wide designed to cheat air pollution tests
- 8.3% percent GDP what air pollution costs India's economy.

Cleaning up our air will also help in the fight against climate change, the biggest environmental problem we face. Currently the company is on a 'kickstarter' campaign, which is a crowd-sourced operation that allows people to pledge a certain amount of money to support innovative services or products. " people from all over constantly ask us how they can get their hands on Air-Ink and use it in their everyday lives. But at this time our pollution capture process is very labour intensive and can only happen on a very small 50 scale. This campaign will allows us to scale up and make Air-Ink more widely

accessible,” the company said. Having filed for patents, it plans to expand beyond automobiles into collection of soot from different sources of pollution such as chimneys and generators. The company claims that it has so far captured 1.6 billion micrograms of particulates which equates “cleaning” 1.6 trillion litres of outdoor air. Each pen contains the Air-Ink captures approximately 40-50 minutes of air pollution/Pm generated by car.

Conclusion:-

After discovering a way to capture pollution, Graviky Lab's has begun repurposing it into an ink called Air-Ink. The benefits of this medium is reduced air pollution, recycling, the carbon for printing, painting, and art needs and realizing the soot as a viable resource with creative benefits. Air pollution is one of the primary contribution to death and disease around the world, so limiting and capturing air pollutant is an excellent way to protect people's health. If air pollutants could be recycled and repurposed into products that are usable by people, it would give people more incentive to capture air pollutants and turn a negative thing into something positive. A new engineering project has managed to do just that, capturing air pollutants and turning them into paints and inks.

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