Chem Sci J 2016, 7:2(Suppl)
http://dx.doi.org/10.4172/2150-3494.C1.003

European Chemistry Congress

June 16-18, 2016 Rome, Italy

Waste plastic to liquid hydrocarbon fuel

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Waste Plastic Waste is huge problem in USA and around the Global. This is global problem. Inventions of the twentieth century, plastics are everywhere. Society has found ample ways to use plastics. But users are less adept at managing the material when they are finished with it—often after only one use. The volume of plastics being produced, used, generated, and discarded is greater than ever before. Plastics therefore require increasing effort and ingenuity to properly manage. Annually, of the 120 billion pounds of plastics produced in the United States only about 6% or 4.8 billion pounds are recycled. For all the talk of plastic ban, plastic production is increasing. Waste Technologies LLC (WTL) has the solution at its disposal. This technology can produce approximately 1.3 liter of "WTL fuel" from one kilogram of plastic waste. The exact yield depends on the type of plastic, and the grade of WTL fuel desired. Typically, the process produces a residue of less than 5% of the weight of the plastic waste. This residue is rich in carbon and may be an environmentally superior substitute for coal with a higher BTU value. The WTL technology is able to cater to a wide range of diverse applications, including but not limited to fuel, gas and electrical generation. NSR's / WTL patented technology, in conjunction with WTL technology and know-how, is a simple and economically viable process to decompose the hydrocarbon polymers of waste plastic into the shorter chain hydrocarbons of liquid fuel. WTL believes that it can convert approximately one tonne of plastic into about 300 gallons of fuel at a cost of about \$0.75-\$1.00 per gallon and produces 4,205 ft^3 (CFT) of light gas (C1-C4) byproduct when developed to commercial size. WTL's refining process is uncomplicated and promises to be very competitive with large crude oil installations. In financial projections WTL uses \$30/bbl. (\$0.71 per gallon) for preprocessing and refining costs. Other plastic recycling technologies generally have a very narrow band of plastics they can use. Nearly all recycling is done with plastic designations 1 or 2 while designations 3 through 7 are virtually untapped (over 70% of all plastic fall within these categories). A combination of economic and technological factors, account for this situation. The advantage of WTL technology is that it can produce a profitable product from material that society generally pays to thrown away. It is this no or low cost feedstock that is the key advantage.

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Scale storage mechanism studies of the advanced anode materials for energy storage

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Lithium-ion batteries (LIBs) can deliver high levels of energy storage density and offer long operating lifetimes, but their power density is too low for many important applications. Therefore, we developed some new strategies and fabricated novel electrodes for fast Li transport and its facile synthesis including N-doped graphene-SnO2 sandwich papers bicontinuous nanoporous Cu/Li4Ti5O12 electrode, and binder-free N-doped graphene papers. In addition, by using advanced in-TEM, STEM techniques and the theoretical simulations, we systematically studied and understood their storage mechanisms at the atomic scale, which shed a new light on the reasons of the ultrafast lithium storage property and high capacity for these advanced anodes. For example, by using advanced in-situ TEM, we directly investigated these processes using an individual CuO nanowire anode and constructed a LIB prototype within a TEM. Being promising candidates for anodes in lithium-ion batteries (LIBs), transition metal oxide anodes utilizing the so-called conversion mechanism principle typically suffer from the severe capacity fading during the 1st cycle of lithiation–delithiation. Also we report on the atomistic insights of the GN energy storage as revealed by in situ TEM. The lithiation process on edges and basal planes is directly visualized, the pyrrolic N "hole" defect and the perturbed solid-electrolyte-interface (SEI) configurations are observed, and charge transfer states for three N-existing forms are also investigated. In situ HRTEM experiments together with theoretical calculations provide a solid evidence that enlarged edge {0001} spacings and surface "hole" defects result in improved surface capacitive effects and thus high rate capability and the high capacity is owing to short-distance orderings at the edges during discharging and numerous surface defects; the phenomena cannot be understood previously by standard electron or X-ray diffraction analyses.

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