From: Phillip Huggan [mailto:thekeystonegarter@gmail.com]
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Subject: NNMI Comments

Hello. I'm a bright guy in Canada. As a Global Warming fighting strategy I've been brainstorming applications for barrels of oil and bucket fulls of tar (and maybe NG depending on GWP); this qualifier preserves refinery jobs making it more palatable. Some Thermoplastics and blends appear recyclable over many cycles. Companies are in the dark about their basic material attributes and the experiments I'm reading of seem limited.
I believe unlocking some superior blends and manufacturing methodologies will significantly stimulate a variety of beneficial/profitable fields while providing a price signal away from gasoline/diesel and heating oil. Just throwing gov money at this problem will enable the field to develop yrs ahead of schedule.

The carbon footprint of ethylene and other thermoplastic feedstocks and compatibilizers isn't known well. Shockwave reactor is chemically the most efficiently devised method to turn a petro feedstock into ethylene (85% conversion) but may have a very large carbon operating footprint, the Sonic Booms and all. It would be nice to have the carbon footprints of existing or new refinery chambers and machines, so the least GWP and most thermoplastic can be promoted as a best practise. There isn't a market for precision products like micro-injection moulding; I suggest subsidizing biosensors that are at least partly recyclable. I prefer flu biosensors but all (boomers will cost less when better dialysis) seem a good ROI. Even a few tonnes of product would be market-making. Wind turbine components aren't yet exhausted and the change in carbon footprint from making gasoline to making wind turbine parts is off the charts. I'm not sure the recyclability of thermoplastic resins in composites will be knowable anytime soon. I really like solar cells that are plastic but it appears only the bulk structural backing can be thermoplastic, complicating both recycling and estimating how large a % of product cost plastic is (has to be a chunk to be worthwhile).
Plastic medical robots, like Japan's geriatric prototypes that drop dummies in tests, might not be ready yet. But I suggest inventing telerobotic plastic ventilators and ECMOs and other distant designer pandemic treatments. Possibly plastic tent hospital beds. It is important to know the material properties of different thermoplastic blends and more importantly their recyclability. I'd like to know the Modulii of common thermoplastic blends after ten cycles.

Micro-injection molding looks cheap. Different processes and experiment conditions (ie humidity affects PMMA Tg temperature) yield different results. Present University experiments seem fine but need more of them to get minimum channel widths machinable for a lab-on-a-chip, for different plastics. Subsidize the most recyclable ones and products from a wide variety of industries will unfold in the private sector's revenue laps. There must be a way to get oil cash in the chemical industry....basic thin parts, tens of microns wide, exhibit different shrikages and stuff. A statistical computer program would help (private sector might add imputs that are

otherwise trade secrets). NIST would be strong in subsidizing basic metrology tools. Teeny process thermometers and Bruker-type instruments. The semiconductor industry is very tangential, but plastics might not handle copper well, for example. There must be a way to get that industry tangentially aiding biosensors (which are dual use but a basis for self-organized social distancing). Maybe PMMA can form a semiconductor with carbon black as an oil fraction?? Thx for your time, Phillip Huggan.