Utility Goo

Utility Goo is a picomechanically active 'smart plastic.' It is composed of specialized constructor picomachines suspended in a substrate composed of hydrocarbon nanostructures. The substrate also contains a relatively small volume of complex biosynthetic, similar in composition to hemosynthesis fluid. Utility Goo varies in color and consistency depending upon its current 'molecular' state.

It was invented by Star Army of Yamatai technician Kuroaki Isuzu in YE 30 and is produced by the United Manufacturing Cooperative.

Functions

Virtual Plastic 'Alchemy'

By picomechanically manipulating the van der Waals forces acting between the hydrocarbon nanostructures in the substrate, Utility Goo can simulate complex polymerization and alter its apparent molecular structure to assume various liquid, solid, semi-solid and semi-gaseous material states (such as aerogels). This allows Utility Goo to simulate materials such as plastic, metal, stone, cloth, soft biological tissues, microfilaments and fluids of varying viscosity.

As these structures are held together in large part by non-chemical bonds (augmented van der Waals forces), Utility Goo can form and repair them rapidly. In general, the more durable the structure, the more time and power-intensive it is to simulate; 'flesh' will form in seconds, while 'metal' may take up to several minutes to form completely. The most durable structure that Utility Goo can simulate is a type of dense crystalline laminate (DR 4).

If given sufficient time and a steady source of power, Utility Goo picomachines can repair virtually any damage done to the substrate, provided that it is not too finely dispersed and has not been rendered chemically inert (i.e., reduced to subatomic particles). The hydrocarbon substrate in Utility Goo is non-flammable and chemically stable. The maximum heat and mechanical stress that it can endure will vary depending upon the structure it has been made to assume, but maintaining the augmented van der Waals forces that hold these structures together may require significant power, depending upon circumstance.

A quantity of Utility Goo with a mass of ~0.44kg/0.97lb will have:

- A Minimum Volume of 0.125L (Cube ~5cm on a side) at Maximum Functional Compression
- A Maximum Volume of 4L (Cube ~16cm on a side) at Minimum Functional Compression

Production and Absorption of Force

Utility Goo can 'flow' in fluid form through the manipulation of van der Waals forces or 'flex' in solid form through the expansion and contraction of long polymer chains, but cannot function reliably in a diffused

aerosol form. The mechanical force that can be produced in this fashion is limited by the stress that the structures involved can endure and the energy available to manipulate the inter-molecular forces involved. Utility Goo can also form nanomechanical 'heat engines' to absorb energy from mechanical stress or radiation (i.e., sunlight). Efficiency will depend upon the volume of substrate devoted to this function, but will generally not exceed 40%.

Biological Simulation

Utility Goo can utilize the biosynthetic components in the substrate to grow synthetic tissues to simulate the attributes of biological life forms or materials derived from them, such as leather. This is generally limited to a thin, external layer of synthetic 'skin' or small 'glands,' which allow the substrate to reproduce tactile details such as texture, fingerprints and hair, and chemical details such as skin secretions, scent molecules, perspiration, saliva and blood.

Data Gathering

The picomachines in Utility Goo can gather sensory data and simulate the five common senses through the analysis of electromagnetic (sight), kinetic (hearing/touch) and chemical (taste/scent) data. The quality of this data will vary depending upon the volume of substrate and picomachines devoted to the task and any specialized data gathering structures that are formed.

Holography

The picomachines in Utility Goo can produce near-field holograms. This function is identical to NH-29 'skin holography,' and allows Utility Goo to reproduce nearly any visual appearance or even become thermoptically 'invisible.'

'Safe' Self-Regulation

Despite being called a 'smart plastic,' Utility Goo possesses no innate capacity for consciousness. The collective processing power of the picomachines contained in the substrate is devoted totally to the efficient management of the substrate's functions. This is by design, as it allows cheaper, civilian-grade picomachines to be used in construction and avoids the potential risks and ethical dilemmas of creating a sentient AI.

Utility Goo cannot self-replicate to gain greater functional volume. A fixed volume of picomachines can only manipulate a fixed volume of substrate. Also, without low-level reprogramming, the picomachines will not chemically process raw materials to replace lost substrate; lost substrate must be replaced with new substrate. The picomachines in Utility Goo are constructed on the subatomic scale utilizing exotic, non-classical materials such as Yarvex. This makes them extremely durable, but incapable of self-replication or self-repair.

Cost and Availability

- Cost: 100 KS/kg (Tentative)
- Availability: General (No Restricted Technologies)