

# F I L T O M I N C.

## Overview of Technologies and Products

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### (1) Technologies and The goal of FILTOM

#### (1.1) PD Separation (*patents pending*)

PD Separation technology, mimics the kidney functionality in the human body's separation system. Our kidney filters 1.8 Liters of blood a day, producing 180 ml of urine that contain waste materials and infectious particles, such as viruses and bacteria. There is no source of high energy to perform such complex operation, for instance, high pressure or electric energy of 100 voltage or atomic energy. It is only 1.3 kPa pressure and bodily temperature that our kidney needs. In comparison, a conventional filtration system, e.g. MF or NF, uses from 200 to 10000 kPa to perform a similar operation.

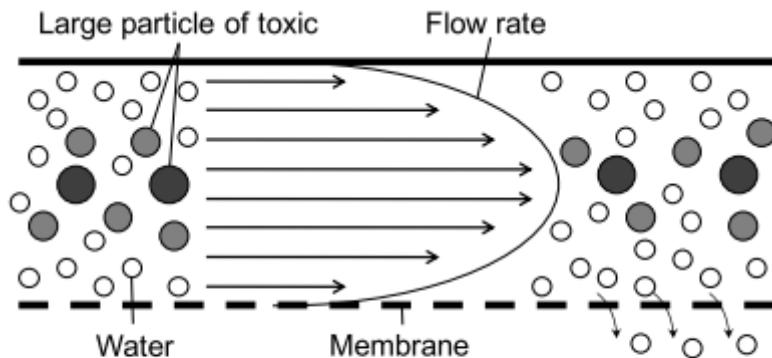
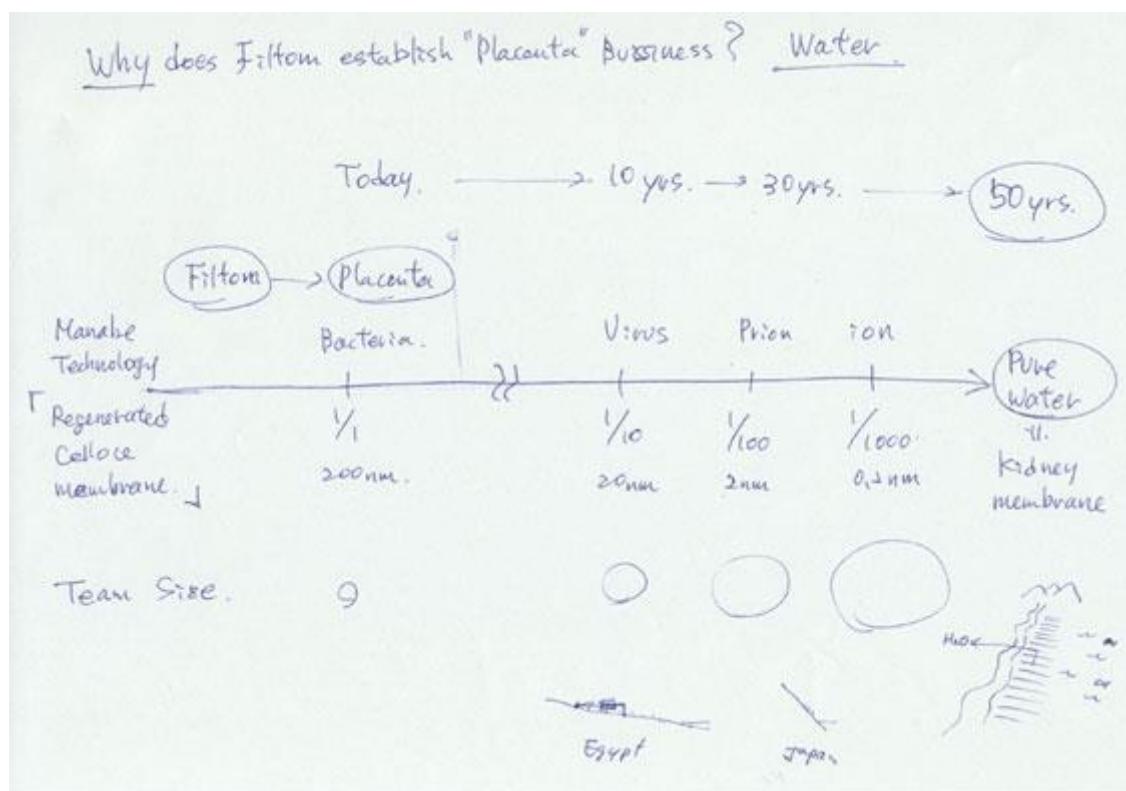


Fig.1: Schematic representation of the flow fractionation mechanism:  
The lengths of arrows stand for the amount of flow rate and are  
represented by a parabolic curve.



In addition, the filtration system of kidney does not depend solely on pore size, but also on pressure and velocity control of blood fluid. PD Separation functions in a similar way, and its unique separation technique makes it possible to purify drinking water, sea water, foods (without compromising on the original taste and functionality), pharmaceutical ingredients, and even waste materials, such as sewage with very low energy equivalent to just one electric bulb.

The goal of FILTOM is the sea water conversion by the PD membrane filtration. In our body, the kidney is filtering and purifying about 200L of water every day. PD membrane filtration has a possibility to fulfil the advanced water purification which is even equal to the kidney. The Placental Plasma is the first step to achieve the goal. Looking ahead to the sea water conversion 50 years future, we share the progress of development. We, FILTOM, keep going on the way to the goal.



## **(1.2) Purification of animal-derived substances using PD Separation (*patents pending*)**

Animal-derived substances are neutralized through conventional heating or chemical methods to remove infectious and contamination particles. While this works in some cases without causing any negative changes in the original structure of the component, many substances are much less stable to such treatments and their activated protein, growth factors, enzymes, vitamins, minerals and nutrients can be easily destroyed.

PD Separation allows for removal of infectious particles (bacteria and viruses), while keeping all the original ingredients and their benefits. Filtom currently works with swine placenta that is rich in EGF (Epidermal Growth Factor), which is unstable under thermal or chemical treatment and is damaged at the temperature of 60 C or in acidic / alkali environment (such as in gastrointestinal, which makes unproven claims of placenta supplements quite questionable from scientific perspective).

## **(1.3) New method of extracting high potassium ions (K+) using PD Separation (*patent pending*)**

Potassium ions (K+) are necessary for the function of all living cells. Potassium ion shifts across nerve cell membranes are necessary for normal nerve transmission: potassium depletion or excess can result in numerous abnormalities, including an abnormal heart rhythm and various electrocardiographic (ECG) abnormalities. Fresh fruits and vegetables are good dietary sources of potassium. The body responds to the influx of dietary potassium, which raises serum potassium levels, with a shift of potassium from outside to inside cells, and an increase in potassium excretion by the kidney.

Our skin cell is an ionic battery cell. It charges itself through the battery system of Na+ and K+, whose concentration differs from inside and outside of the cell wall. K+ has higher concentration inside of cell. Yet in our modern life, the concentration of K+ tends to decrease, as the supply of K+ from tap water and our nutrition is very limited. As a result, the skin cell's metabolism doesn't function as good as it is supposed to. Using PD Separation technology, Filtom has developed a new unique method of avoiding coprecipitation and keeping higher potassium K+ ions in hot spring water. The company found a source of low temperature spring, over 65 Celsius, and extracts the hot spring water before it is exposed to open air. The hot spring is biologically clean and is rich in K+, Na+ and other minerals.

#### **(1.4) Liquid Natural Soap (*main technological patent pending*)**

Synthetic soaps may cause various damage to our skin: they remove the natural oils from our skin pores and clog them, cause more skin irritation or even health problems that you may be unaware of. Moreover, in many cases they do not even exhibit an effective anti-bacterial function, for instance the recent studies on triclosan.

On the other hand, natural soaps, based on oils of either plant or animal origin, cleanse our skin without causing any allergic reaction or any other damage, with a natural anti-bacterial functionality. The current saponification technologies have not developed much for centuries, and only allow production of solid soaps. In some cases additional energy-intensive techniques are used to melt solid soaps using additional ingredients to produce liquid natural soaps, however the complexity and inefficiency of such methods made them impractical for consumer goods. As a result, low-cost synthetic soaps, which are virtually detergents, dominate the market.



## (2) Current products and applications

### PD Separation products

#### (2.1) PLACENTA C6 product series

This product line features purified swine placenta in a Placenta Cream, Placenta Plasma, Placenta Serum and Placenta Water with a high concentration of EGF. No thermal or chemical neutralization process involved, which seriously compromise relatively unstable EGF (damaged already at 60 C).

**PLACENTA C6** product series are products made of the pure placenta supplied directly from a pig factory in Fukuoka prefecture. The pig farm undergoes a rigid control to avoid any infections and keep the animals healthy. The collected placenta is then processed with PD Separation system to remove infectious particles at the ISO Sterility Assurance level (SAL) of 1/1000000, while performance-wise this performance significantly exceeds SAL requirements. For instance, a conventional heating process achieves only the level of 1/10~1/1000.



#### (2.2) YAMADA IZUMI

YAMADA IZUMI features purified natural skin lotion from a famous Japanese hot spring in Beppu. Rich in potassium ions ( $K^+$ ) and sodium ions ( $Na^+$ ), it also exhibits the original healing power of Japanese onsen water, helping recover and maintain skin's health. In particular, on our skin these minerals are responsible for activating the production of ceramides and hyaluronic acid.



### (2.3) Liquid Natural Soap

One of Filtom's latest technologies, currently as a basic soap from oils of plant or animal origin.  
At this stage will be marketed as premium natural soap product,



### **(3) Perspective future applications and applications in development**

#### **(3.1) PD Separation**

- current collaborative project with Kyushu Institute of Technology on cleaning of ponds and swamps from blue-green algae and bacteria;
- currently being tested new prototypes of waste water and sea water filtration system using new generation of PD Separation systems;
- conceptual mass-scale sea water filtration for agricultural and drinking water purposes;
- purification of liquid food substances, including milk and various food additives, which makes the conventional neutralization unnecessary;

#### **(3.2) Liquid Natural Soap (based on all organic components)**

- body soap;
  - hand soap for everyday use and for premium market with added value and additional components/features;
  - shampoo.
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### **(4) Major Challenges**

- scaling production. The current limited production facility only allows for small volume and labor-intensive (partially automated) manufacturing and operations, therefore the focus has been on high added value and high margin products, such as swine placenta.
- financial and human resources to keep up with growing sales and to utilize the full potential of the technologies.