The collaboration research for the Dual Graduate School between VNU and JAIST

[Title of collaboration research]:

Development of new polymeric materials by nano-rheological approach

[The members of collaboration research]:

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[Reference home-page address]: **http://www.jaist.ac.jp/ms/labs/yamaguchi/english/index.html**

[Other references]:

[Contents]

The research target of our laboratory is to develop a new type of polymeric materials by the approach of nano- and/or molecular-rheology as follows;

1. **Biomass-based plastics**

   Material design is carried out for high-performance and/or functional polymeric materials composed of biomass-based plastics, such as poly(lactide), poly(3-hydroxy butyrate), and cellulose derivatives. The following projects are carried out currently;

   (1) Development of high-transparent material with small birefringence by molecular composites
   This material may be employed as protection film and/or retardant film for LCD display.

   (2) Development of purification materials from a biomass-based polymer
   One of the targets of this project is to clean up dirty water by means of microbe.

2. **Design of high-performance materials from conventional plastics**

   Various properties of conventional plastics are improved by applied rheological technique as follows;

   (1) Enhancement of processability for recycled poly(ethylene terephthalate) by molecular modification
   The processability of recycled PET is quite poor. This project will widen the application of recycled PET.

   (2) Improvement of transparency for polypropylene with sorbitol-derivatives
   The material design for transparent PP composite, in which the morphology is controlled at nano-scale, is carried out based on the theoretical background on the light scattering.

   (3) Control of rheological properties for molecular composites composed of polyolefins or polyesters
   Molecular aggregation state of blends is precisely controlled to improve the rheological properties and thus processability.

3. **Development of functional polymers**

   New type of polymeric materials with unique function is developed by the rheological control with the molecular scale;

   (1) Molecular design of self-repairing materials by topological interaction
   New type of self-repairing polymers is developed utilizing the topological interaction of polymeric materials.

   (2) Sound-absorbance materials