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Synthesis of highly active Pt nanoparticles with grape seeds (*Vitis vinifera*), mangosteen skin (*Garcinia mangostana*) and clove (*Syzygium aromaticum*) as the reducing agents

The latest development of nanotechnology has been using bio-material as a reducing agent to synthesize nanoparticles. Bio-materials such as plants can reduce metal ions both on the surface and in the various organs of plants. Plants contain antioxidant compounds that can reduce metal ions. Here, grape seeds (*Vitis vinifera*), mangosteen skin (*Garcinia mangostana*) and clove (*Syzygium aromaticum*) were used as reductant. These biomaterials are classified as weak reductants. Grape seed contains the main antioxidant, oligomeric proanthocyanidins (OPC) of ~78% which plays a main role as a reducing agent, whereas mangosteen skin contains xanthone (~84%) and clove contains eugenol (~85%) as the main antioxidant. We synthesized Pt nanoparticles by using the bio-materials mentioned above via microemulsion method. The results from characterization with transmission electron microscopy show that metal nanoparticles with different shapes were produced. By combining the thermo-destabilization of microemulsion technique and the use of the bio-reductants, we are able to produce a highly active supported Pt nanocatalyst. The results show that the activity of the produced Pt nanodendrites is much higher than those which were prepared with the harmful chemical (hydrazine). This superior activity is due to the anisotropic structure of the produced Pt nanodendrites. In a challenging reaction such as hydrogenation of levulinic acid, which is normally carried out at high temperature (~240°C) and high pressure (~100 bar), the produced Pt nanodendrites are able to reach 98% of GVL (biofuel) selectivity at 94% conversion at a mild reaction condition (1.3 bar and 70°C).

Biography

Riny Yolandha Patapat has completed her PhD at Technical University of Berlin (TU-Berlin). Currently, she is pursuing her Postdoctoral Research at TU-Berlin. She is also a Lecturer at Itenas, Bandung. Her speciality is in the field of nanomaterial synthesis, catalysis in the greener way and biofuel production.

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