

ABSTRACT

To provide an oxygen and hydrogen production technology that is novel, convenient, and environmentally suitable, and decomposes water at a high rate. Based on the finding that an aromatic amine polymer acts as an oxidation catalyst that generates oxygen from water and a polyarylenevinylene acts as a reduction catalyst that generates hydrogen from water, oxygen and hydrogen are generated at a high rate by applying a slight overpotential relative to an equilibrium potential because these catalysts operate at a very low overpotential. Further, irradiation of the water-oxidation-oxygen-generation catalyst with light including solar light increases a production rate of oxygen and hydrogen. The aromatic amine polymer and the polyarylenevinylene are both aromatic polymers, are low cost, and have considerably high durability in water over a wide pH range and in addition, they may have hydrophilicity or hydrophobicity, interface area, and shape suited for electrode catalysts.