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Design of Tunable Broadband Conjugated-Polymer Laser and Their Applications

Mohamad S AlSalhi

King Saud University, Saudi Arabia

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Abstract

Tunable lasers are needed for research in the medical, engineering and basic science fields. Until recently, few optically pumped tunable lasers, such as fiber, Ti:sapphire and forsterite lasers, have been available. We found that conjugated polymers and oligomers were compatible and complementary materials that could perform better materials for solid-state laser media than laser dyes. The tunable, solid-state, conjugated-polymer laser is to design an efficient broadband tunable conjugated-polymer laser in solution. This was done for a green copolymer Poly[(9,9-dioctylfluorenyl-2,7-diyl)-co-(1,4-diphenylene-vinylene-2-methoxy-5-{2-ethylhexyloxy}-benzene)], also known as (PFO-co-PPV-MEHB). The polymer was studied using computer simulation and also experimental. A powerful and low-cost laser has plenty of applications; hence, a low-cost laser not only has high demand but also can create new opportunities in future applications. Oligomers are new materials with advantages such as low cost, high performance, and scalability. In that work, we designed a novel method of producing low-cost, efficient solid-state laser media using an oligomer embedded in a solid-state matrix made of many commercially available materials such as acrylic glue, AB resin, and EVA resin. In this background, a new laser is designed using an oligomer (BECV-DHF) as the active laser material.