Lipase Catalyzed Solid State Reactions

Pirro Cipi and James W. Rawlins

The University of Southern Mississippi
School of Polymers and High Performance Materials
118 College Drive #10037
Hattiesburg, MS 39406-0001

Polymeric materials exhibit gradually diminishing properties over their lifetime, yet their applications demand consistent performance over extended periods of time. An extensive body of literature agrees that degradative events ultimately impact properties by altering polymer connectivity. Our research focuses on the viability of using enzymes as catalytic additives to maintain polymer connectivity in films. Octanoic acid and 1-nonanol, model substrates for enzymes, were embedded with lipases within various polymeric films and incubated at different temperatures for up to 250 hours. ^{1}H NMR and acid assays were used to characterize changes in film functionality during incubation. Using a 3^{k} full factorial experimental design, the impact of incubation temperature and enzyme loading on the conversion of solid state reactions has been evaluated. The effect of polymer film glass transition temperature on lipase catalyzed reactions was studied as well.