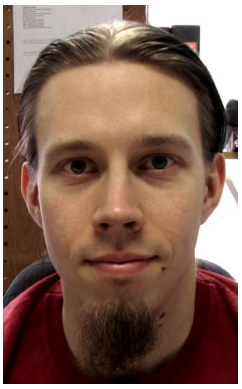
Kuisma Littunen
Polymer Technology
Aalto University School of Chemical Technology
kuisma.littunen@tkk.fi



Free radical graft copolymerization of nanofibrillated cellulose

Nanofibrillated cellulose (NFC) has interesting properties, like large specific area and considerable mechanical strength. It would make an ideal reinforcement for nanocomposites but unfortunately its compatibility with most bulk polymers is poor. My research concentrates on the modification of NFC by graft copolymerization, aiming at hydrophobization and functionalization of NFC. I am using a redox-initiated free radical polymerization carried out in aqueous medium, which is a great advantage because no solvent exchange is required.

The method has been found efficient with several monomers, and I have been able to modify the appearance and hydrophobicity of NFC (Figure 1) while retaining the nanosized structure (Figure 2). Thermoplastic behavior has also been observed with grafted NFC of high polymer content. In future I will try to expand the variety of modifications and use some of the existing functional products in further reactions. The applicability of the products will be investigated in e.g. polymer composites, wear-resistant coatings, and antibacterial materials.

Figure 1. Water droplet on hydrophobic NFC grafted with poly(ethyl acrylate) (NFC-g-PEA).

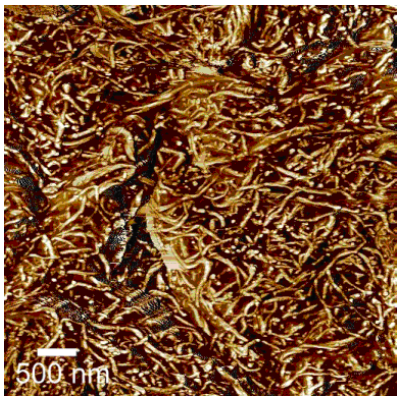


Figure 2. AFM phase shift image of NFC-g-PEA.