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Surfaces with very high water contact angles have been attracting a great deal of attention. The work done here was in the design and development of an anti-fog coating(a coating that does not allow fog to be formed). The hydrophilic(water attracting property) as well as the hydrophobic(water repelling property) approaches were investigated before developing the super-hydrophobic(highly water repellant) coatings. Accordingly, various phenomenon such as the adherence of snow or raindrops are expected to be inhibited or reduced on such surfaces.

Hydrophobic properties are enhanced by increasing surface roughness at the micro and nano scales. Such roughnesses cannot be discerned by the naked eye. Super-hydrophobic surfaces require both appropriate surface roughness and low surface energy materials and numerous methods to attain these requirements have been demonstrated. We have made extensive use of nano-particles(particles that are hundreds of times smaller that the width of a human hair) to help us in achieving the roughness that was needed to create these super-hydrophobic surfaces. Also low surface energy materials such as PTFE(Teflon - the same material that's used in non-stick pans) and THV(a similar material) were investigated as potential candidates for the matrix materials(the coating material) in which the particles could be embedded.

Super-hydrophobic materials were successfully created with the help of these nano-particles. These films were so super-hydrophobic that water droplets were shown to bounce off such surfaces. Videos have been included of such a behavior in this thesis. We hope that these surfaces can be used someday as anti-fog surfaces as they do not allow the tiny droplets of water that cause fog to form on them.