Simple technique results in surprising repellency results

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(PhysOrg.com) -- Anyone who has ever worn eyeglasses for any length of time can surely attest to the annoyance of constantly having to clean off the oil left behind by finger touching. Not only does it dirty the lens, but removal requires a solvent, rather than a simple tissue. Doris Vollmer can relate, and that's just what got her thinking about the soot given off by her Christmas candles. As a polymer research scientist with the Max Planck Institute in Germany, she knew the soot was water resistant, but what she wanted to know was whether it was oil resistant as well. So, she and her colleagues held a glass slide over a candle and then tested it. In doing so, as she and her team describe in *Science*, they found that after some tweaking, the result was a truly remarkable repellency material.

After discovering that the soot that showed up on the glass slide not only coated the glass in black, making it impossible to see through, they also found that it wasn't very stable either. Water dripped on it rolled right off, but carried some of the soot with it, which would mean constant reapplication if trying to use it as a repellant. To counter the instability, they coated they soot with silica using a chemical vapor process. Then, to make the black coating clear, the whole works was calcined (heated to bring about a thermal decomposition). The result was a clear omniphobicity (repels both oil and water) coating that could have many uses in commercial products.

It turns out the soot is naturally water resistant due to the way its carbon particles align themselves on a surface, much like a fractal type network,

where there just isn't enough space for water or other liquids to pass through. The team found that the bonds were so strong that the material retained its repellency qualities even when blasted with sand or abused in other ways.

It's not clear just yet if the coating will indeed one day be applied to eyeglasses, forever relieving wearers from the vagaries of fingerprints, but the results thus far look promising for treating various metals or glass to create non-stick surfaces for use in a variety of industrial applications.

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