

Re: EPD TiO2 coatings

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- *From:* Uncle Al <UncleAl0@xxxxxxxxxxxxxx>
 - *Date:* Sat, 28 May 2005 09:32:50 -0700
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zygimantas wrote:

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- > I have stainless steel 304 with polished surface. I treated it with
- > degreasing solution. before EPD. Etching can be proceeded only with
- > "qua regia" or warm sulfuric acid. 304 is nitric acid resistant. In
- > my case better results were obtained with polished not etched surface.
- > The idea of this work is to develop simple and cheap as possible method
- > for TiO2 coatings on commercial available substrate. Without any
- > additional intermediate layers (for example tin oxide).

"The idea of this work is to develop simple and cheap as possible method"

Simple, Cheap, Effective: Pick any two. If it doesn't work it makes no difference how simple and cheap it is to manufacture.

Building some surface oxide with nitric acid passivation while simultaneously chewing off all surface contamination sounds like a good experiment to enhance bonding. Passivate, treat with a smidgeon of tetrabutyltitanate to bond a tie layer, then coat. Sounds like a winner. Try anodic passivation, too.

When you have something that works you then go back to minimize costs with process changes. That is making stuff and that is what a scientist does. When you don't know what works and you look for a maximum on the response surface – that may or may not be there to be found – all you create is progress reports. That is making things and that is what an engineer does.

First stuff, then things. No stuff, no things.

When Uncle Al was in the human implantables game one of his employers dumped serious money on an academic engineering group that cast nearly a thousand polymerization runs – in water – looking for a strong, high refractive index hydrogel. You would be suitably impressed by acres of response surfaces and their polynomial fits that came forth. It was an incredible sheaf of work. All of it was crap.

Severe strength and refractive index boosters contain sterically

Re: EPD TiO2 coatings

hindered, highly polarizable backbone moieties like N-vinylcarbazole. All of the really good ones are water-insoluble. Pookie pookie. Hydrophobicity is a *good* thing to strengthen hydrogels! The hydrophile sucks in water trying to dissolve. The hydrophobe seeks itself and associatively vulcanizes the rubber. About 0.1% crosslinking holds it all together over time.

If you want a strong hydrogel you cast it as the xerogel with crosslinking. When it hydrates everything pulls taut isotropically. Hell, you can only machine the xerogel anyway. If you dehydrate a hydrogel to machine it you have no idea how it will reswell. Freeze-drying destroys the polymer when the water crystallizes. We could put in additives that make water freeze glassy then wash them out afterwards... and waste more money to buy more progress reports.

First call in scientists to create something that works – the stuff. Then call in engineers to transform the stuff into a product – the thing. If you have really good stuff even an engineer cannot totally ruin it – that requires a production supervisor.

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Uncle Al

<http://www.mazepath.com/uncleal/>

(Toxic URL! Unsafe for children and most mammals)

<http://www.mazepath.com/uncleal/qz.pdf>

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• **References:**

- ◆ **EPD TiO2 coatings**
 ◇ From: zygimantas
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