

Silanization set-up

Silanization set up is used (in our lab) to graft –NH₂ layer by using aminosilane on the surfaces like Si, SiO₂, SU-8 in an inert atmosphere. It's a wet method of surface modification.

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Materials used: Si, SiO₂, SU-8, Si₃N₄, Optical fibers



Silanization set-up

Start up procedure

1. Take the sample (SiO₂/SU-8) with the aid of tweezers.
2. Wash the sample with DI water thoroughly.
3. Dip the sample in acetone and sonicate for 10 minutes.
4. Pour the acetone back into the used acetone jar.
5. Dip the sample in Sulphochromic acid and let the system incubate for 10-15 minutes.
6. Pour the Sulphochromic acid back into the used jar.

7. Wash the coverslips thoroughly with DI water and dry them using a jet of inert gas (Ar) on the sample.
8. Samples are placed on a heating plate (120°C for almost 2 hours under vacuum) for dehydration covered by a bejar.
9. Now the entire setup is sealed and inert gas environment is created (Ar in our case) as Argon is heavier than air, it will gradually settle at bottom pushing air to top.
10. Now the displaced air is let out by opening the air valve from the system.
11. Prepare the 1% Aminosilane solution using ethanol and acetic acid (5ml+2ml).
12. Dip the heat treated sample (from step 8) in above prepared silane solution for 5 minutes.
13. After silane treatment, samples are taken out using tweezers and washed thrice with ethanol.
14. After washing with ethanol, samples are heat dried on heating plate (at 110°C for 10-15 minutes)
15. Now these silanized samples can be stored for future use.

Precautions

1. Never sonicate the acid (sulphochromic acid gets oxidized from orange to green); as it is rendered useless.
2. Polymer (Teflon) tweezers should be used normally because if metal tweezers are used, acid treatment would form metal salts that would then be deposited on the substrate, thus contaminating it.
3. Since sulphochromic acid is hydrophilic, so sample must be thoroughly cleaned and dried.
4. Silane should be handled with utmost care, if it gets exposed to air/moisture, it polymerizes making it useless. If it is spilled on the workbench, it is a real mess.

Chemical safety

- Aminosilane:**
1. Can cause severe irritation if it comes in contact with eyes and skin.
 2. Repeated or prolonged contact may cause chemical burns to eyes and dermatitis of skin.

3. Aminosilane is capable of generating small amounts of methanol when reacted with water. Methanol vapor may cause dizziness, drowsiness, disturbance of vision and tingling.

Sulphochromic acid:1. It contains concentrated H_2SO_4 , which is highly corrosive by its strong exothermic reaction with water. Hence burns from sulphochromic acid are potentially more serious than those of comparable strong acids (e.g. hydrochloric acid).

2. Because of having hexavalent chromium ($K_2Cr_2O_7$), after contact, inhalation or ingestion it may cause dermatitis, allergic and eczematous skin reaction, skin and mucous membrane ulcerations, perforation of the nasal septum, allergic asthmatic reactions and bronchial carcinomas.