# Silane conditioning of glass slides

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Tissue sections have to adhere firmly to glass slides in all histological procedures. Adhesion is usually due to the close contact between flat surfaces (i.e. the section and the glass slide). In practice, however, tissue sections are not really flat and slides are rarely perfectly clean. Moreover, histological techniques will often change the forces which enable firm contact between section and glass slide. In order to prevent loss of tissue sections during further treatment, adhesives and methods of inclusion have been developed.

Celloidin treatment of tissue section is one of the first protective measures used in histotechnique to prevent sections from falling off or extraction phenomena. This technique is still employed in some histopathological stainings such as in Best's carmine method. Then, adhesives became developed on the basis of starch paste, egg white, gelatin or bovine serum albumin (BSA). BSA and chrome alum gelatin are still used with good success in histological applications.

Many of the above mentioned "old" adhesives proved to be impracticable or unsatisfactory, thus, attempts were made to overcome for example handling problems or insufficiencies which may become manifest during histochemical section treatments. It was thought that adhesion of oppositely charged surfaces can be generally enhanced by coating the slides with appropriate charges. Since tissue sections possess a net negative charge at physiological pH, adhesiveness of tissue sections can be enhanced when slide surfaces are positively charged. This can be either done by coating the slides with a basic polymer or by chemical reactions which leave amino groups covalently bound to the glass slide.

The treatment of glass slides with L-polylysine was a breakthrough with respect to improved adhesiveness (HUANG WM et al. 1983). Then, with the introduction of positively charged glass surfaces by chemical reaction of slides with 3-aminopropyltriethoxysilane (APES), a most versatile method was found with the advantage that due to the method of covalent bonding positive charges are not washed away (MADDOX PH and JENKINS D 1987). Today, one can select from a variety of silanes and other chemicals as section adhesives. *

## Preparation of silanized slides

| **Chemicals** | **Chemical solution** |
|---|---|
| 3-Aminopropyltriethoxysilane (APES)<br>Acetone (dry, 99.5% pure)<br>Chromic acid | • Silane (APES) solution:<br>2.0 mL APES dissolved in<br>100.0 mL acetone |

* Chemicals for coating purposes can be toxic. They must be handled with care

| | |
|---|---|
| Extran Merck MA 01<br>Distilled water | • 10% Extran MA 01:<br>10.0 mL Extran MA 01 added to<br>90.0 mL distilled water |

**Coating procedure**

The use of clean glass slides is crucial to obtain reproducible results. This preparative step is done either with chromic acid (for 4 hours) or with 10% Extran solution (overnight). Slides are placed in a glass slide holder (staining rack) and the holder is placed in a glass tray (Coplin jar):

| | |
|---|---|
| – Extran solution | overnight |
| – wash in running hot water | 90 min |
| – distilled water | several rinses |
| – drying at 100°C | 60 min |
| – silane (APES) solution | 1-2 min |
| – acetone (pure) | 2 x 1 min |
| – distilled water | 2 x 1 min |
| – slides are dried at 37-45°C | overnight |

Coated slides are stored at room temperature (stable for several months)

## References for further readings


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Full citation of publications is given in chapter *References*
link: https://www.kuhlmann-biomed.de/wp-content/uploads/2020/12/References.pdf

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