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BioGrip – FREEZE GRIPPING WITH PARAFFIN WAX

In traditional histology, microscopic tissue sections are examined with the aid of special staining techniques. For this purpose, micrometric stained tissue sections are produced and examined under a microscope. By means of histological sections often very precise diagnoses can be made. A histological finding is especially required if the potential malignancy of a tissue alteration has to be clarified.

Before a pathologist/biologist can assess the histological details of a patient's tissue sample / an experiment, the tissue must be submitted to an intensive processing. These techniques are summarized as histotechnology. They are mainly performed by biomedical analysts in a histological laboratory.

- Fixation for stabilizing tissues (common fixative 4% neutrally buffered formaldehyde solution)
- Dehydration: Removing the water from tissues, mostly in an ascending series of hydrophobic alcohols

- Infiltration of the tissue by molten paraffin wax
- External embedding the tissue in paraffin wax: embedding in a sliceable medium (paraffin block).
- In modern histological laboratories the tissue samples are placed into embedding cassettes.
- Sectioning of 2-5 µm thick tissue sections in a microtome
- Mounting the tissue sections on (coated) glass microscope slides
- Staining the tissue/cells (histological staining)
- Covering: Preparing for storage by sealing the tissue under a glass lid on the slide

Histological specimens treated in this way then can be examined by a histologist or, in case of a diseased tissue, by a histopathologist.

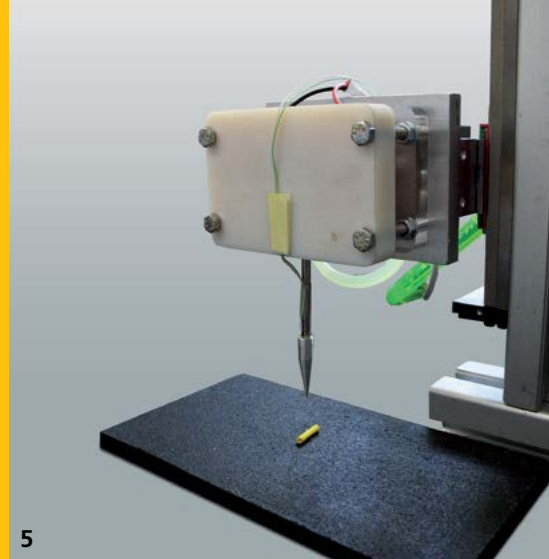
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Challenge

Especially the embedding into paraffin wax requires a lot of skill, in particular a high level of dexterity, and therefore is a process hard to reproduce. What is more, handling the sample with pincers always enhances the danger of artefacts, i.e. structures or features in tissue, that interfere with normal histological examination. Thus samples may become worthless for the actual object of study or may lead to diagnostic errors.

Our solution

For this reason, our project BioGrip focuses precisely on the process of embedding biological samples into paraffin wax. The result of recent research is a frozen gripper which allows a very protective gripping of the samples. As a medium to be frozen, paraffin wax is utilized. It has a melting temperature of slightly below 60 °C. The use of paraffin wax as a medium ensures that no additional material component is entered into the system or that no residue can remain. At the touch of a button the tip of the gripper can switch between the two reference temperatures, 52 °C and 62 °C, by means of a heating wire and air cooling.

The gripping process is performed as follows:

- Wetting the tip of the gripper with liquid paraffin wax ($T = 62\text{ °C}$)
- The tip of the gripper is moved to the target object
- At the touch of a button the tip cools down, the paraffin wax congeals and adheres to the target object
- The gripper is moved to the required position along with the target object
- At the touch of a button the tip of the gripper warms up, melts and releases the target object at the required position

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www.bioproduktion.com

4 Application of the BioGrip

5 BioGrip in an automated machine