Silicatization

INNOVENT
Technology Development

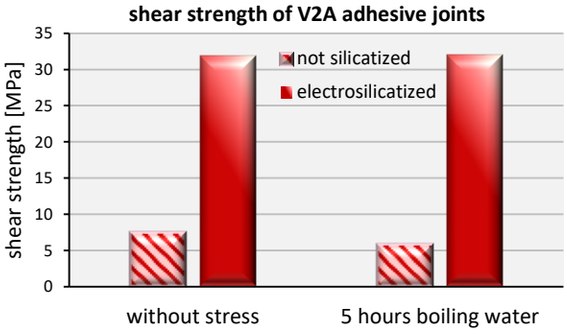
Research Department: Primer and Chemical Surface Treatment

⇒ adhesion improvement, hydrophilization, functionalization

\+ clean, versatile, energy efficient, economic, robust

Generally, silicatization is the deposition of nanoscale silicate-like layers on surfaces. These silicatic layers are usually hydrophilic and very active. On many substrates, the silicatic layers forms an excellent base ground for making of high-impact composites. Using silicatization techniques, stainless steels, precious metal - free or -containing dental alloys, titanium and many other materials can be adhered with long-term stability and high resistance to hydrolysis.

In addition to the well-known techniques such as silicatization by flame, plasma or grid blasting further methods exists which can be beneficially applied in accordance with their characteristics:



Example: Improving the adhesion of stainless steel adhesive joints by electrosilicatization and use of silane coupling agent – unstessed & after boiling water treatment;

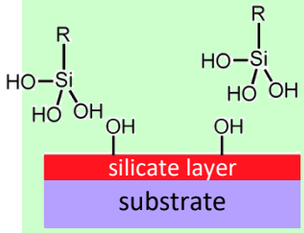
adhesive: epoxy resin & amine hardener;

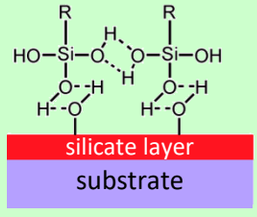
coupling agent: formulation based on glycidoxypropyltrimethoxysilane

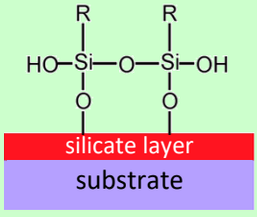
***Elektrochemical silicatization*:** This technique takes place in a similar manner to a galvanic process by means of electric current in a dipping bath or in a tampon-electroplating arrangement. An advantage of this technique is the possibility to accomplish an effective silicate deposition in deep through-holes or blind holes, which is hardly achieved with other methods. The substrates are not exposed to temperature.

Gas phase silicatization: This variant is ideal for the treatment of larger quantities of small parts. The temperature load of the substrates is about 200 °C.

Laser based silicatization: This silicatization with use of laser radiation takes place in a dipping bath. It allows a very precise silicatization. Due to the laser passive layers are removed in situ and replaced by the silicate layer. The substrates are not exposed to temperature.







Covalent binding of a functional silane (*e.g.*, adhesion promoter) to a silicatized surface

Our range of services:

- selection of the best process, development as well as parameter optimization
- selection and optimization of associated coupling agent formulations
- feasibility studies
- laboratory tests and treatment of pattern parts
- scientific advice on the selection and use of silicatization techniques

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