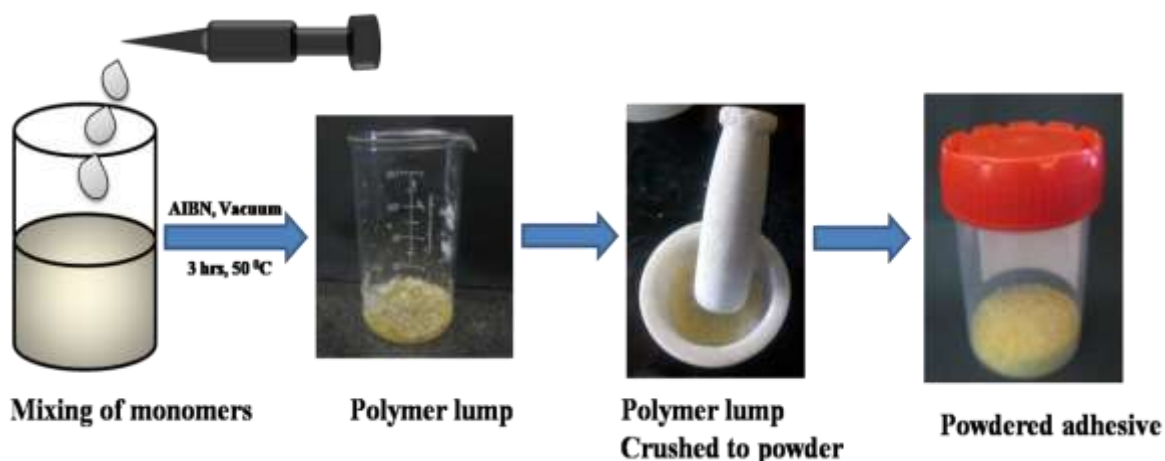


High-performance water-borne fluorescent acrylic-based adhesive with High Thermal Stability

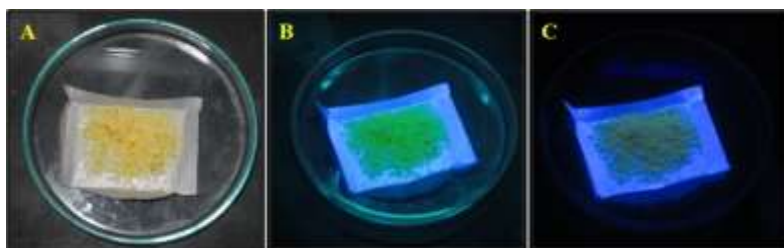
Details about the technology:

A water-borne adhesive without toxic organic vapours has been developed, which can be stored in powdered form for long-term use and is therefore easy to carry and handle. The adhesive is thermally stable up to 300 °C and has greater strength than popular commercially available adhesives. The adhesive is fluorescent in nature, without adding any external fluorescent agent. The invention was already patented with Indian Patent No. 388151, Patent Application No. 202031001224 granted on 31.01.2022.

The series of steps depicting the formation and storage of adhesive as powder is as follows:



1-vinyl-2-pyrrolidone (VP) + acrylonitrile (Acn) + acrylic acid (Acr) > P(VP-Acn-Acr)



Photographic images of P(VP-Acn-Acr) under (A) Normal light, (B) UV light (254 nm) and (C) UV light (365 nm)



A model wood design to show the applicability of the adhesive in wood crafting



Figure depicting a broken design, joined by the adhesive and the visibility of the fractured joint observed under the UV light (365 nm)



Figure depicting the visibility of the words written by the adhesive under UV light (365 nm), which are invisible under normal light

We claim that the synthesis of the adhesive is:

- Solvent-less synthesis of the copolymer (VP-Acn-Acr), a greener approach, as is evident from the preparation scheme.
- An easy approach to long-term storage of polymer in powder form, for about 5-6 months, thus overcoming the durability issue of commercial adhesives.
- Waterborne adhesive characteristic of the polymer, hence reducing the release of toxic organic vapours in the air.
- Ready-to-use nature of the adhesive under any condition, with the addition of just a few drops of water.
- Thermally stable adhesive, stable up to 300 °C and thus useful for high-temperature adhesive applications.
- The usefulness of the adhesive to bind cellulosic materials at room temperature without the use of a curing temperature.
- Applicability of the adhesive to bind different types of materials, such as metals, glass, plastics, thermosets, etc., on high-temperature curing.
- Fluorescent characteristic of the adhesive obtained without the use of external additives, evidence showed as an image under a UV lamp. This property is helpful in the detection of fracture joints of materials attached by the adhesive. The fractured portion is visible under UV light, whereas being unnoticeable under normal light.
- Fluorescent characteristic of the adhesive also makes it a suitable candidate to be used as an anti-counterfeiting agent to be useful in passing secret messages.

Patent status:

Title of Patent: *A Waterborne Thermally Stable Fluorescent Acrylic Based Adhesive and a Green Method of Synthesis of the Adhesive*

Patent Assignee: IASST, Guwahati

Current Status: *Granted on 31.01.2022, Indian Patent No. 388151, Patent Application No. 202031001224*

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