Sviluppi nella formulazione di adesivi per il risanamento di beni culturali

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Abstract

Adesione e consolidamento sono problematiche attuali e delicate nel campo del restauro. Uno dei prodotti maggiormente impiegati è un termoadesivo a base sintetica: BEVA®371 Original Formula (O.F.). Gustav Berger studiò la formulazione per applicazioni su policromie, soprattutto dipinti su tela, spesso oggetto di fenomeni di decoesione tra i materiali in opera. La sua popolarità unitamente ai dubbi sulla sua stabilità durante l'invecchiamento sono alla base del progetto, volto inizialmente alla caratterizzazione chimico-fisico-meccanica di questa formulazione e di quelle successivamente commercializzate. Dal 1971 la ricetta, condivisa da Berger stesso, è stata modificata due volte, cambiando solamente il principale agente di adesione al fine di sopperire all'interruzione della produzione del componente originario (2010) e per ottenere proprietà ottiche e di presa più simili a quelle iniziali (2018). Data la complessità della miscela, si è proceduto a creare sistemi binari/ternari per studiare l'interazione tra le componenti e le proprietà adesive sviluppate, al fine di arrivare a una formulazione alternativa più stabile. La ricerca si è focalizzata sulla caratterizzazione di componenti quali copolimeri acrilici o etilene-acrilici oltre che su resine idrocarburiche, diterpeniche o ureo-aldeidiche e cera, da sole e in miscela, valutandone tanto la stabilità chimica quanto le proprietà meccaniche attraverso un approccio multi-analitico. I risultati hanno evidenziato come compatibilità, miscibilità e residui di solvente influenzino la formazione del legame tra adesivo e substrato. Inoltre, ci si è posti l'obiettivo di individuare il valore ideale di forza del legame risultante dal trattamento, così da proporre una formulazione quanto più adeguata alle esigenze conservative moderne.

Keywords: adesivo, consolidante, BEVA®371, miscele sperimentali, caratterizzazione, approccio multi-analitico

Progress in formulating new adhesives for conservation purposes

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Abstract

Painted works of art are often subjected to adhesion and consolidation failures. In 1971, Gustav Berger published the formulation and released BEVA®371 Original Formula (O.F.), a lining adhesive designed to replace old wax-resin treatments. Due to its popularity and concerns about its stability, the current study was undertaken to characterise this multi-component product and its re-formulations from the chemical-physical-mechanical point of view. Only the tackifier was changed with time: because the original was discontinued (2010) and to adjust heat-set and optical properties and make them closer to the O.F. (2018). In order to investigate alternative polymers and tackifiers, the next step was preparing binary and ternary experimental blends to study the interaction between components and investigate the influences they have on tack. Results have raised several questions related to the role of miscibility and compatibility between components, the presence of wax, and residual amounts of solvent on the quality of the bond of the adhesive on different substrates. The question has also been raised how strong the bond should be, considering the delicate substrates involved and the required reversibility. Currently several materials (acrylic and ethylene-acrylic copolymers and different tackifiers such as hydrogenated hydrocarbon, urea-aldehyde, rosinate ester resins) are being investigated individually and as blends looking at chemical stability as well as mechanical performance. A multi-analytical approach is followed, combining thermal and chemical data (DSC, FTIR), with mechanical tests (rheology, lap shear, peel).

Presented here is an overview of the project along with some of the results obtained so far.

Keywords: adhesive, consolidant, BEVA®371, experimental formulations, rheology, multi-analytical approach

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