

Private Company

FAST - Fast Adhesion Screening Tool

MATERIALS

Background

Adhesion is relevant for adhesives and coatings. It determines the bonding between adhesive labels and coatings on substrates (macroscopic), but also the adhesion between an inorganic ingredient and a polymer in a coatings formulation (microscopic). Adhesion is a combination of chemical and physical processes that take place on different length scales and on different time scales. The process that leads to adhesion is highly diverse. For a pressure-sensitive adhesive it results from compressing two surfaces in less than a second. For coatings, it results from drying of a fluid formulation on a solid surface in minutes. There is no conventional adhesion test that is applicable to both examples.

Fast adhesion screening would help us in two ways: (1) We would be able to screen a large number of model recipes in order to develop deeper understanding of what influences adhesion in a given application. (2) We could use fast adhesion testing in order to do a pre-screening before going into more elaborate application tests which are used to best match an application.

What we're looking for

There are many methods that are providing adhesion data but they are rather slow, i. e. they cannot test 100 different samples in one day in an automated or semiautomated manner. Besides tests with larger-size specimen (scrape adhesion test, pull-off test, cross-cut test, peel resistance test, loop test etc) there is the idea to accomplish adhesion testing in an AFM (atomic force microscope). The AFM method is not at all feasible for screening because exchanging samples in an AFM is inherently slow. On the other hand, sample preparation for an AFM might be rather quick and feasible for a screening mode because of the small sample size.

Solutions of interest include:

- One or two test methods that cover the whole application range from adhesives to coatings
- testing adhesion at larger interfaces (like coated articles or adhesive labels)

Our must-have requirements are:

- The test must be fast enough to allow 100 adhesion tests per day with minimum manual labor.
- The test must be carried out with a tool (to be developed) that can be manufactured at a price that is common for analytical instruments – we are not posting a price tag because this is very much influenced by what the instrument ultimately could be used for.
- The tool can be set up in any lab, requires no complicated infrastructure and can be operated by trained analytics lab staff.
- The TRL should be 3 (experimental proof of concept) or higher.

Our nice-to-have requirements are:

- An automated test would be ideal but a test that can be done manually with little effort and in short time is good enough.
- An adhesion testing tool that would be exclusively developed for us would be nice but we would agree that it is sold to the broad market if we can use it prior to others.

What's out of scope:

- A method that has NO potential to be developed into a commercial testing apparatus within 3-4 years.
- After 3-4 years: a testing apparatus that cannot be operated in standard lab facilities by standard lab staff.
- After 3-4 years: a testing apparatus that cannot be manufactured and sold by an analytical instruments company (because we need the after-sales service of an analytical tools company).

Acceptable technology readiness levels (TRL): Levels 3-9

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

- **Co-development**
- **Sponsored research**

Benefits:**Sponsored Research**

Whether the partner for the joint development would receive funding from us depends on exclusivity, TRL, and the general set-up of the collaboration . An internal project would run at our company over 3-4 years to support a joint development project with an external partner. We are an international chemical company with >10,000 people in research and development.

Expertise

Partners will have access to internal team/experts as appropriate.

Data

Partners can leverage the data set for additional insights regarding the solution.

Facilities and Services

Partners can send samples for analysis at our facilities.

Please contact the University of South Florida Technology Transfer office representative for submission - Roisin McNally at rmcnally@usf.edu.