

## **Semi-Annual Progress Report**

**Project Number and Title:** 2.3: Measuring Adhesion Between Binders and Aggregates Using Particle Probe Scanning Force Microscopy at Low Temperatures

**Research Area:** Thrust 3 Use New Materials and Systems to Build Longer-lasting Bridges and Accelerate Construction

**PI:** *Ting Tan, University of Vermont*

**Reporting Period:** *First semi-annual report*

**Date:** *March 28, 2019*

### **Overview:**

The research will accurately quantify the adhesion between asphalt binders and aggregates at low temperatures since this feature substantially affect the performance of asphalt mixtures in cold regions. We will use the particle probe scanning force microscopy to measure the adhesive forces between different asphalt binders and aggregate minerals, which an experimental technique only available at University of Vermont. The problem is important because low temperature cracking is one primary distress of pavement materials in New England area. It is estimated that only half of the major US roads are in good condition, whereas thirteen percent are in poor condition (AASHTO, 2009). Every year, the construction and maintenance costs for the US roadway infrastructure are approximately \$100 billion dollars with the largest portion in asphalt paving.

We are working on the sample preparations and equipment.

### **Participants and Collaborators:**

Prof. Ting Tan, Civil & Environmental Engineering, University of Vermont, Project PI

Ph.D. student Zhuang Liu, Civil & Environmental Engineering, University of Vermont,

Vermont Agency of Transportation:  
Aaron Schwartz

### **Changes:**

None

### **Planned Activities:**

Prepare asphalt substrates and particle probes