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Asphalt Binder Reinforced with Graphite Particles (20140157, Dr. Jia-Liang Le)

IP Status: Issued US Patent; **Application #:** 15/443,549

Improved Asphalt Tensile Strength, Creep Stiffness and Strain Tolerance

A new graphite particle reinforced asphalt binder exhibits superior mechanical properties compared to existing binder formulations. Adding graphite particles to binder doubles the asphalt's tensile strength at low temperatures and significantly reduces the compaction effort required to prepare the mixture. In addition, creep stiffness and strain tolerance showed significant improvement while maintaining the asphalt's desirable relaxation properties.

MN-IP Try and Buy

Try

- Trial period is six months
- Trial fee is $5000 per six months
- Trial fee is waived for MN companies or if sponsoring $50,000+ research with the University
- No US patent expenses during trial period

Buy

- $30,000 conversion fee (TRY to BUY)
- Royalty rate of 3% (2% for MN company)
- Royalty free for first $1M in sales

Relaxation Properties Not Affected

Adding graphite typically affects relaxation properties adversely; however, the relaxation properties of the graphite particle reinforced binders essentially stayed the same. In addition, creep stiffness increased by up to 30% and compaction effort (number of gyrations to 95% compaction) decreased – in one case, by more than half.

The graphite particle reinforced asphalt may also exhibit better durability and a lower risk of cracking in low temperatures, thus extending the life of the asphalt. In addition, compaction can occur at half the time and effort and at lower temperatures, possibly reducing environmental effects and even extending the construction season.

Recycle Asphalt Pavement and Shingles

Reduced compaction effort translates to potential cost savings associated with compacting the final asphalt product (e.g., paved roads). Larger amounts of recycled materials, such as reclaimed asphalt pavement and reclaimed asphalt shingles can be incorporated, too, further cutting costs. And while the cost of this new technology is comparable to polymer-modified binders, it allows for building a better, more durable product.

Technology ID
20140157

Category
Engineering & Physical Sciences/Materials
Engineering & Physical Sciences/Transportation

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BENEFITS AND FEATURES OF GRAPHITE PARTICLE REINFORCED ASPHALT BINDERS:

- Superior mechanical properties over current industry standard materials
- Doubled strength at low temperatures
- Improved creep stiffness and relaxation properties
- Significant decrease in compaction effort
- More durable and longer lasting asphalt than when using traditional polymer modifiers, and at similar costs
- Could extend the construction season
- May show advantages in other applications (e.g., asphalt roofing materials)

Phase of Development - Proof of concept

Researchers

Jia-Liang Le, PhD
Assistant Professor, Department of Civil, Environmental and Geo- Engineering
External Link (www.cts.umn.edu)
Mihai Marasteanu, PhD
Professor, Department of Civil, Environmental and Geo- Engineering
External Link (www.cts.umn.edu)
Mugurel Turos
Department of Civil, Environmental and Geo- Engineering