



Modification of Bentonite by Solution Plasma Treatment: Implications for Reinforcement in Natural Rubber Latex-Based Nanocomposites

This study examined the potential to enhance bentonite clay for use in natural rubber by treating it with a specialized method known as the solution plasma process (SPP) with silane coupling agent Si69 and without Si69. The plasma treatment altered the surface of bentonite by removing loosely attached carbon materials, introducing beneficial oxygen groups, and reducing the particle size. Under the plasma, the Si69 molecule was altered; some parts of Si69 formed chemical bonds with the bentonite, while another part attached loosely to the surface and didn't react chemically.

The interlayer of clay was larger after the modification, which was due to the mixing process, not the plasma treatment. When the treated bentonite was added to sulfur-prevulcanized natural rubber (SPNR), it strengthened the rubber, primarily because the weak boundary layer of bentonite was removed, and the particles were smaller after plasma treatment. Under the tested conditions, using Si69 didn't improve the strength of the nanocomposites any further, because it didn't bond strongly to the bentonite during plasma treatment. The main improvements came from the solution plasma process itself.

The associated SDG goal is Responsible consumption and production (12).

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Reference

K. Muenkaew, A. Watthanaphanit, P. Sa-nguanthammarong, **S. Wirasate**, Modification of bentonite by solution plasma treatment: Implications for reinforcement in natural rubber latex-based nanocomposites, Applied Surface Science 706 (2025) 163609.

