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Topic of the Speech:
The Mechanical Mechanism of Knitted Strain Sensor for Pulse Wave Monitor from Skin Surface

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Dr. Zhongda Chen is a Postdoctoral at School of Biomedical Engineering and Informatics, Nanjing Medical University, P.R. China. He received his M.Sc. and Ph.D. degree from the Department of Materials, The University of Manchester. Under the supervision of renowned textile expert Prof. Henry Yi Li, he worked on the biomedical applications of textile materials such as fibers and knitted fabrics, focusing on the design and manufacture of wound healing devices and fabric-based flexible mechanical sensors. In 2022, he joined Professor Benhui Hu's research group at Nanjing Medical University for his postdoctoral work, focusing on the mechanical sensing of knitted fabrics for cardiovascular disease detection. During his tenure, he was selected for the "2023 Jiangsu Province Excellent Postdoctoral Program".

His research interests lie in fibrous functionalized materials for the development of biomedical devices, implantable electronics and sensors. His research findings have been published in international high-quality journals, including Materials & Design, Materials Science and Engineering: C, ACS Omega, Advanced Functional Materials and ACS nano.

ABSTRACT SUBMISSION
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The Mechanical Mechanism of Knitted Strain Sensor for Pulse Wave Monitor from Skin Surface

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ABSTRACT (NO MORE THAN 500 WORDS:)

The high incidence and mortality rates of cardiovascular diseases (CVDs) have garnered significant societal attention. Early prevention of CVDs relies on the precise monitoring of arterial sclerosis progression and embolic events.
High-fidelity acquisition of pulse characteristic waveforms from the skin surface is pivotal for wearable sensors to diagnose vascular pathologies. Traditional elastomeric polymer strain sensors fall short in meeting the requirements for rapid rebound response, stress-strain-electric coupling consistency, and wet-state stability necessary for waveform-based disease diagnostics. Knitted strain sensors offer structural advantages over conventional sensors, yet further optimization is warranted. Building upon the author's prior groundwork in knitted device sensors, this research aims to reveal clinical diagnosis of vascular pathologies by optimizing the stress-strain-electric coupling performance of knitted strain sensors.

1. Refine the constitutive relationship of knitted structures to enhance their rapid rebound capability under compression along the Z-axis.
2. Regulate stress-strain-electric coupling performance to improve the fidelity,
accuracy, and sensitivity of pulse waveform measurements obtained from the body surface.
3. Investigate mechanisms for mitigating artifacts caused by liquid infiltration into sensors during wet-state measurements.
4. Extract quantified metrics of arterial sclerosis, and compliance from normalized pulse waveforms and establish their correspondence with clinical diagnoses.

This research elucidates the force-strain-electric coupling mechanisms underlying knitted structures in measurements of pulse waveform from the skin surface, offering new concepts and methodologies for diagnosing CVDs.