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(54) **Title:** COMPOSITIONS AND METHODS FOR NUCLEIC ACID EXTRACTION AND PURIFICATION

(57) **Abstract:** Aspects of the disclosure relate to methods for extracting and/or purifying nucleic acids from biological samples. The disclosure is based, in part, on methods comprising contacting DNA in a sample with a polyhedral, rigid substrate under conditions under which the nucleic acids interact (e.g., adsorb or bind) with the substrate to form aggregates, and eluting isolated or purified DNA from the substrate after washing or other sample processing techniques. In some embodiments, methods described by the disclosure result in less sheared isolated or purified DNA relative to previously employed substrates. The resulting isolated nucleic acids may be used for sequencing, for example ultra-long read DNA sequencing.

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