

Oberflächenaktive Additive – ebenfalls eine Möglichkeit zur Temperaturabsenkung

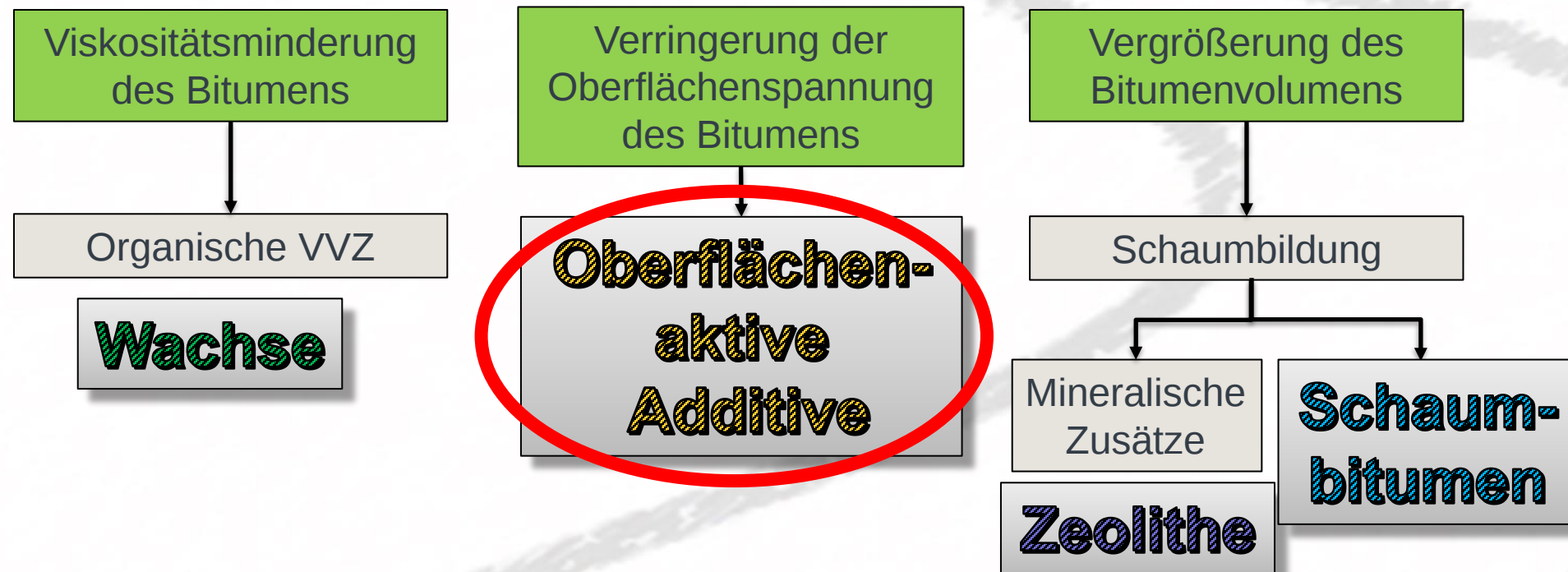


Kay Willmeroth

Ingevity Holdings SRL



Verfahren zur Herstellung von temperaturabgesenktem Asphalt





Woraus besteht ein oberflächenaktives Additiv???

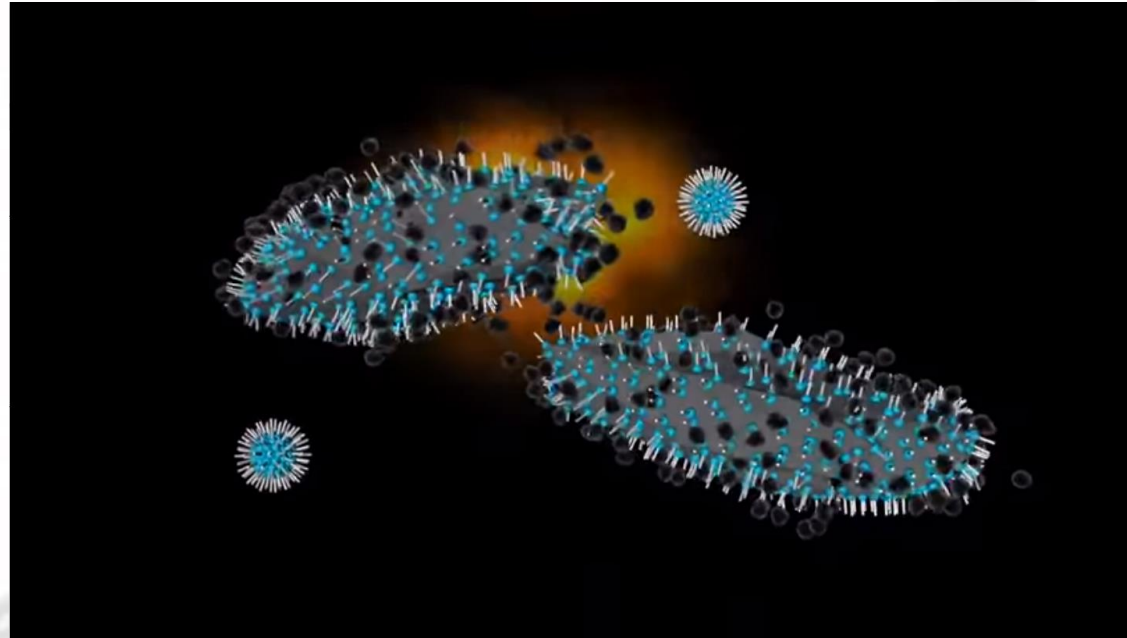
Unpolare Kohlenstoffkette

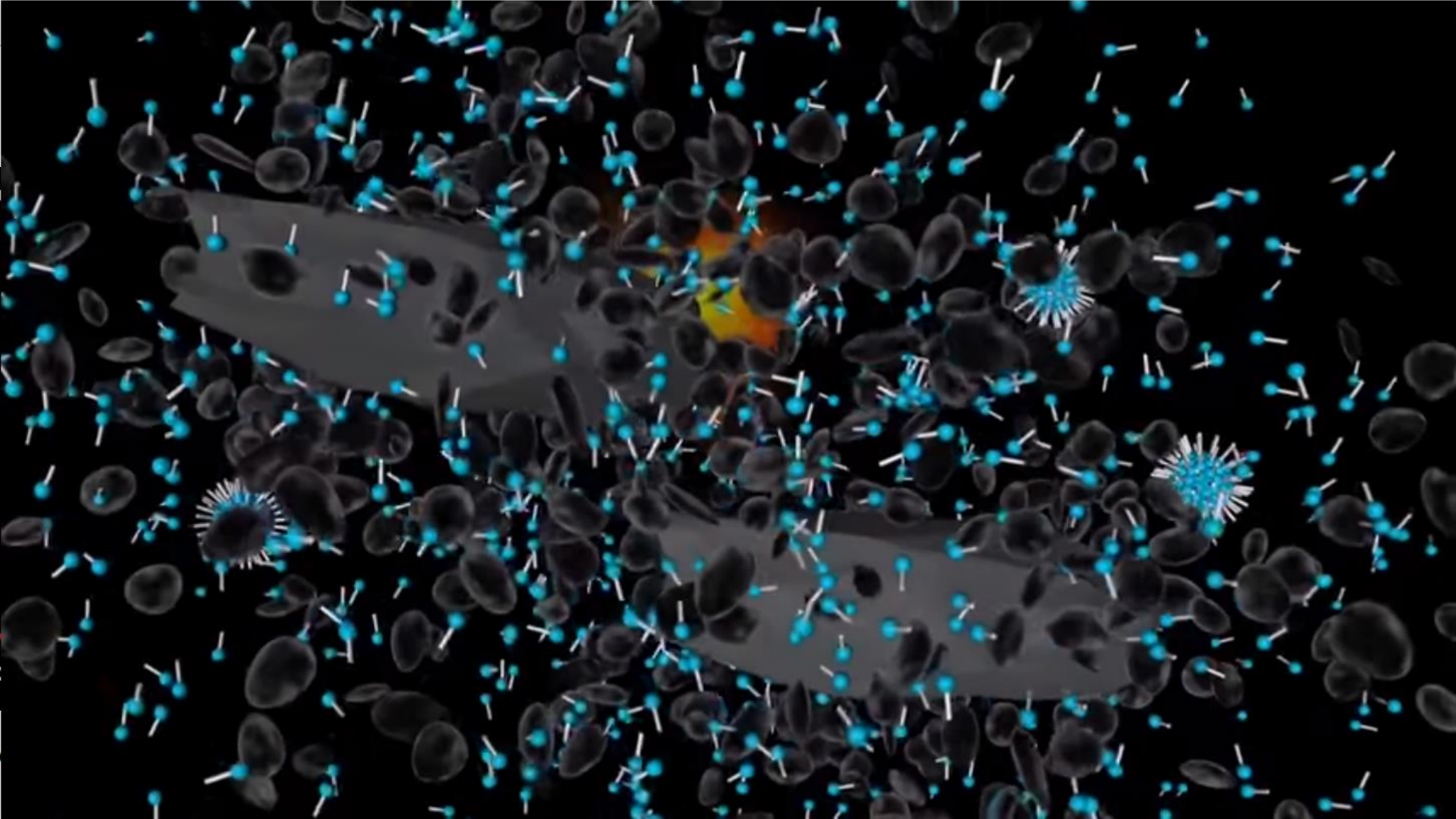


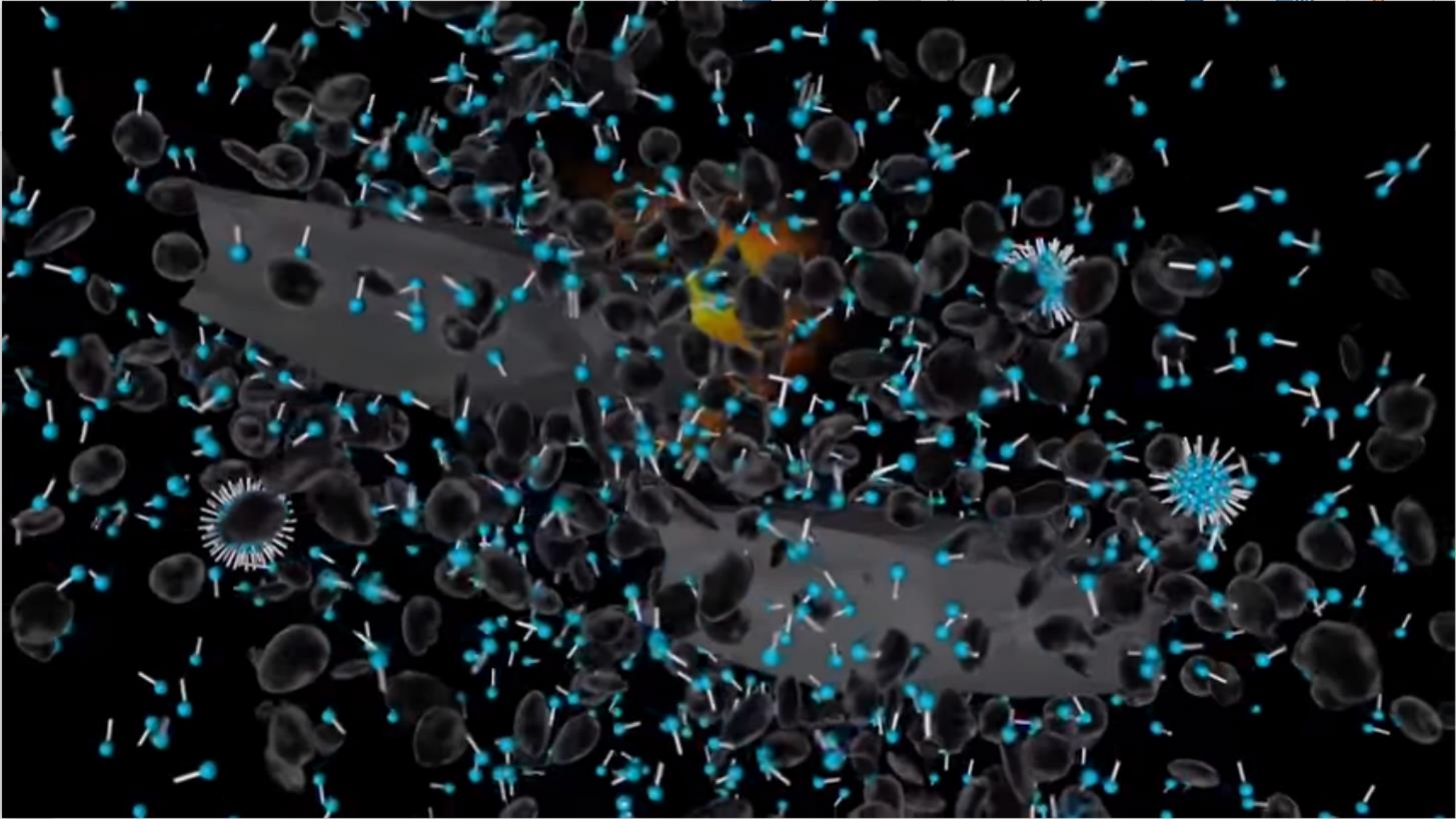
Mineralöl löslich
Affinität zu Bitumen

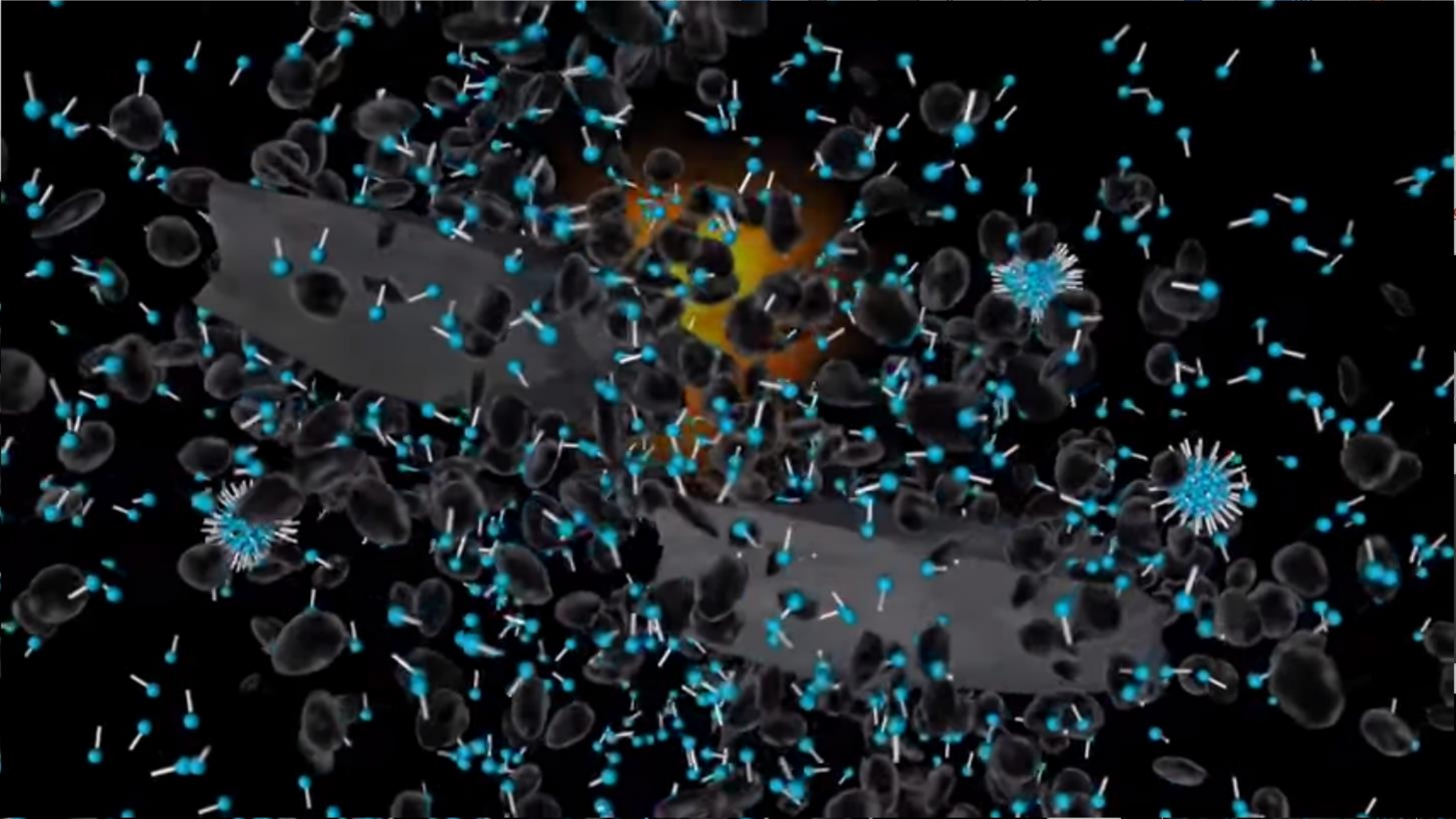
Affinität zum Gestein
und Wasser

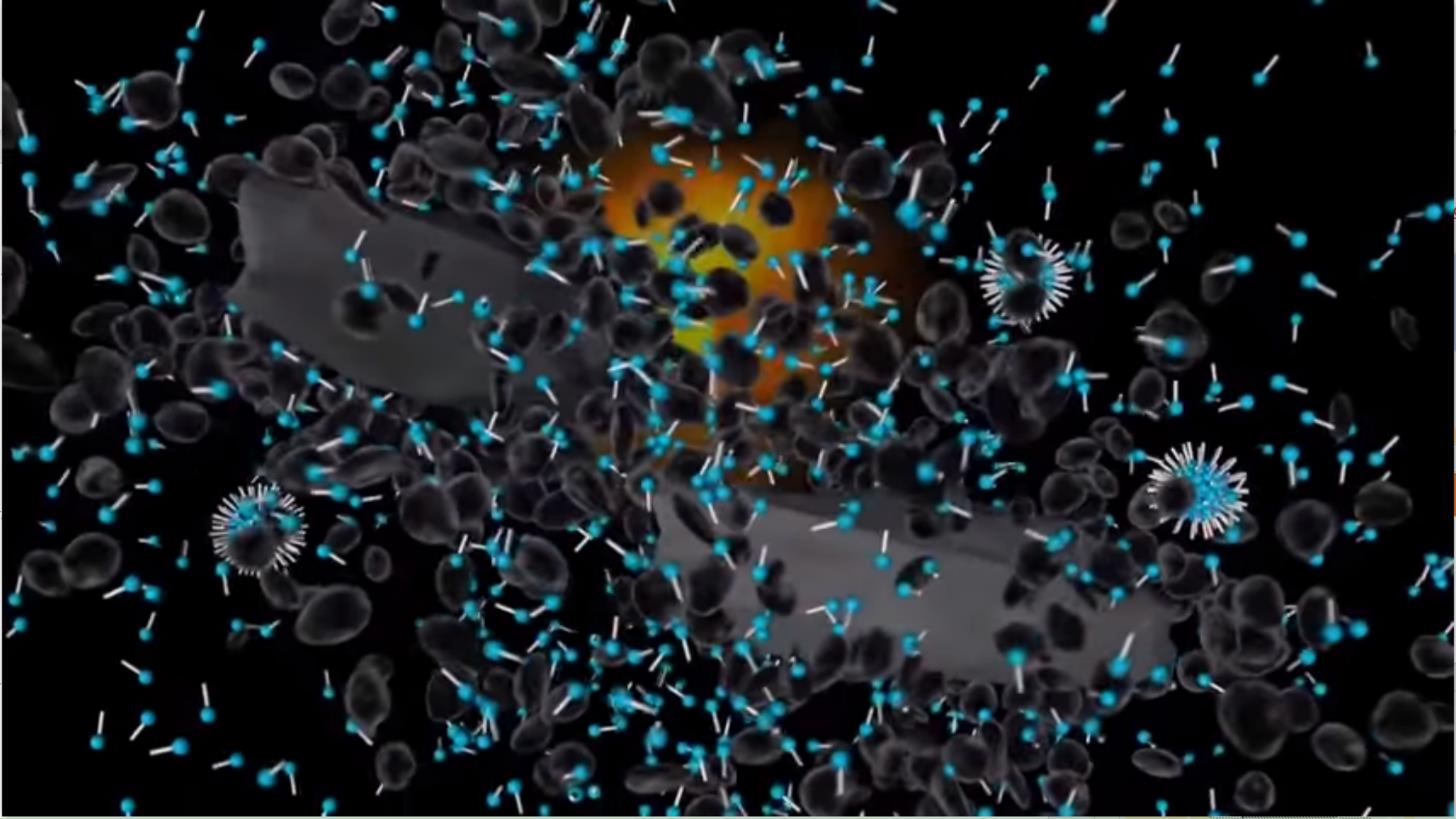
Vernetzungsprinzip

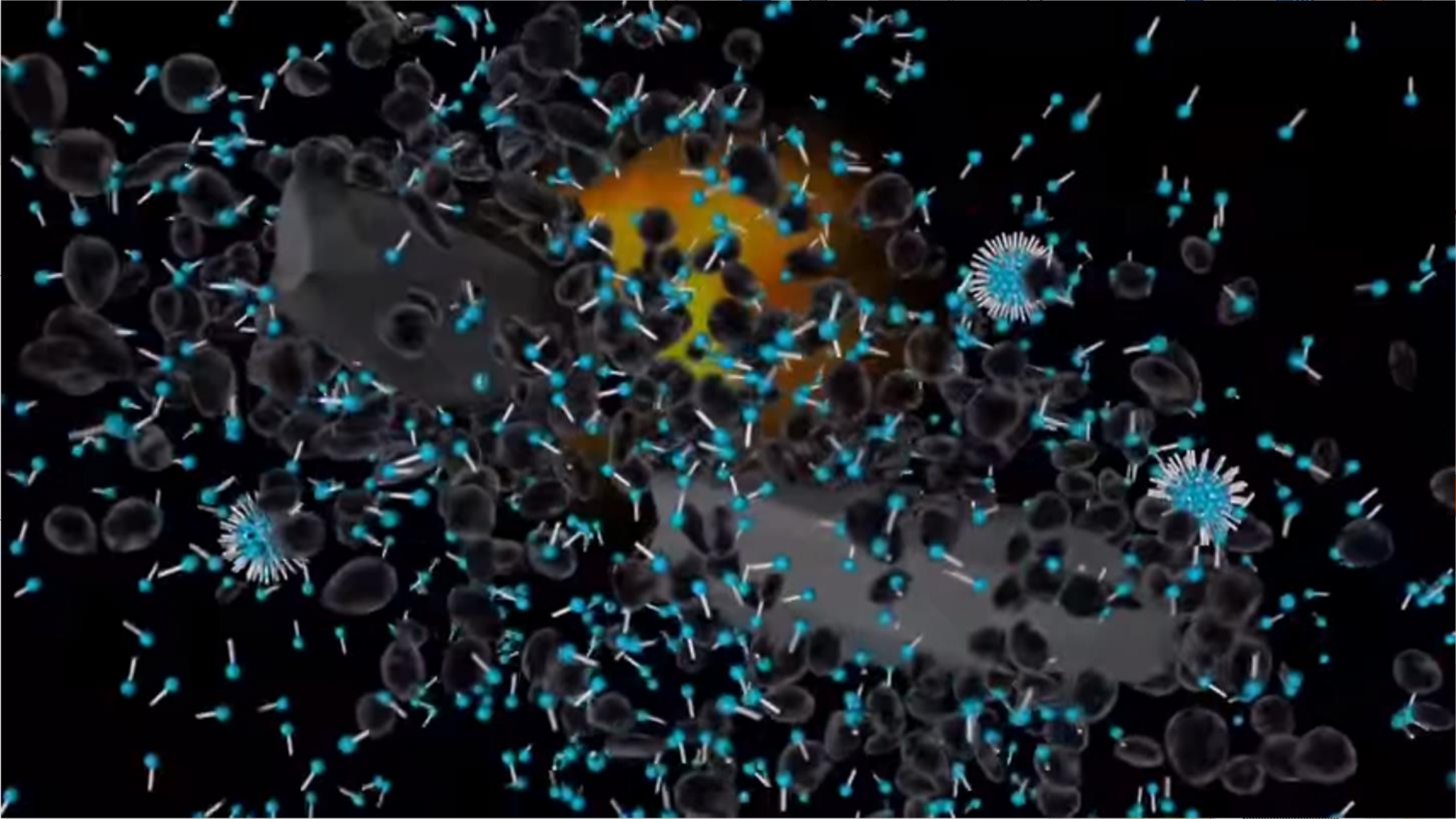


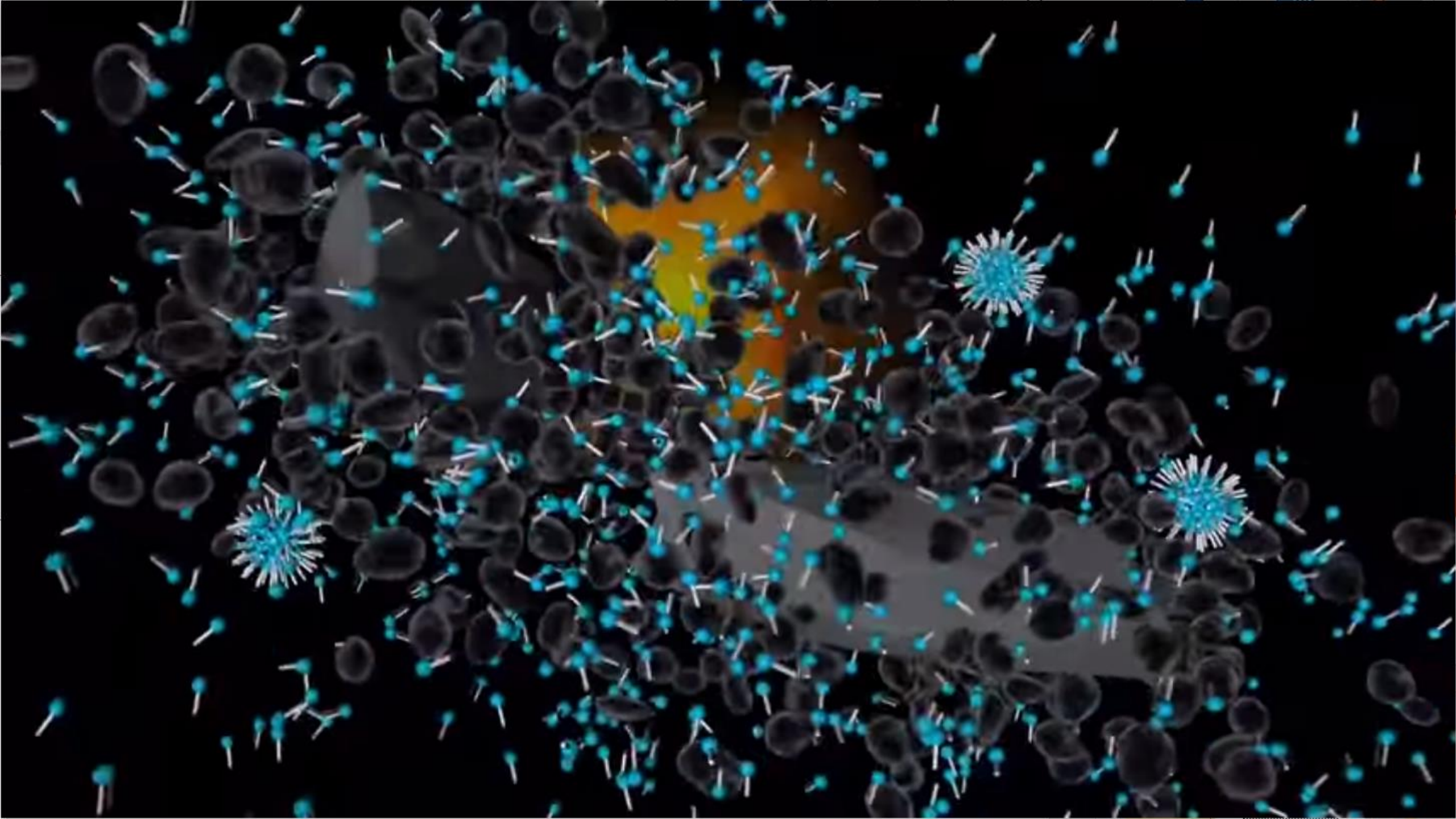


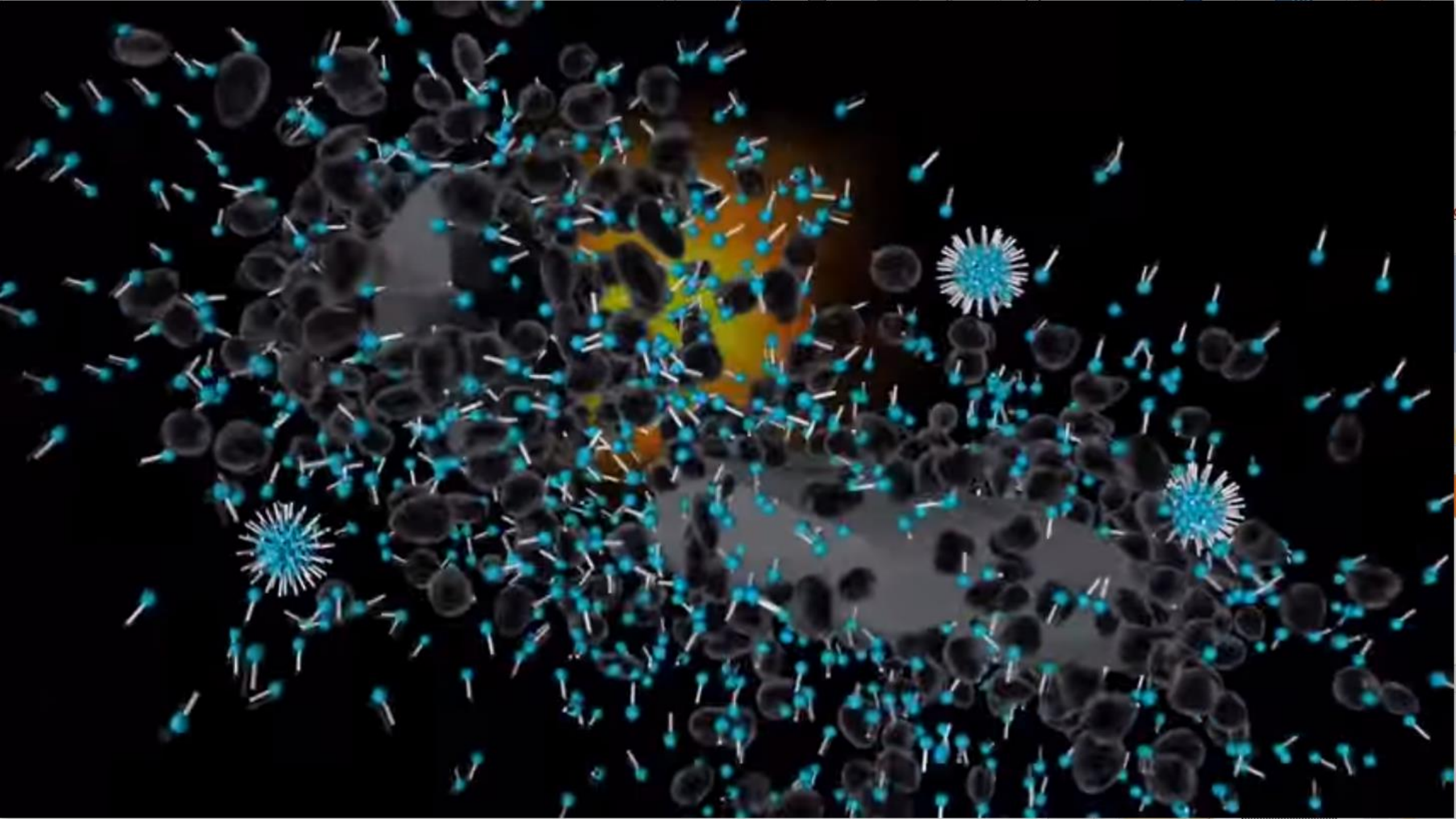


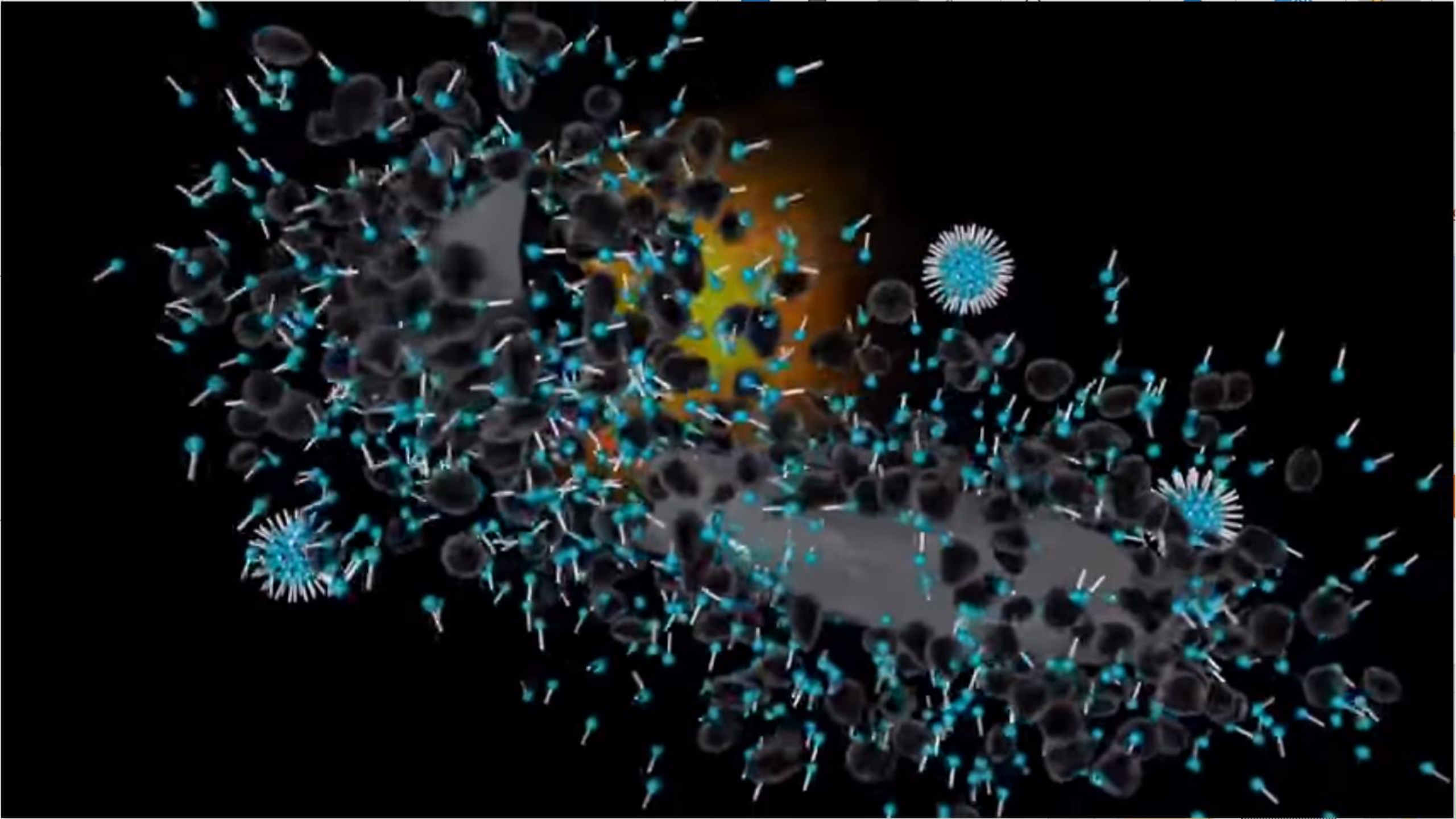


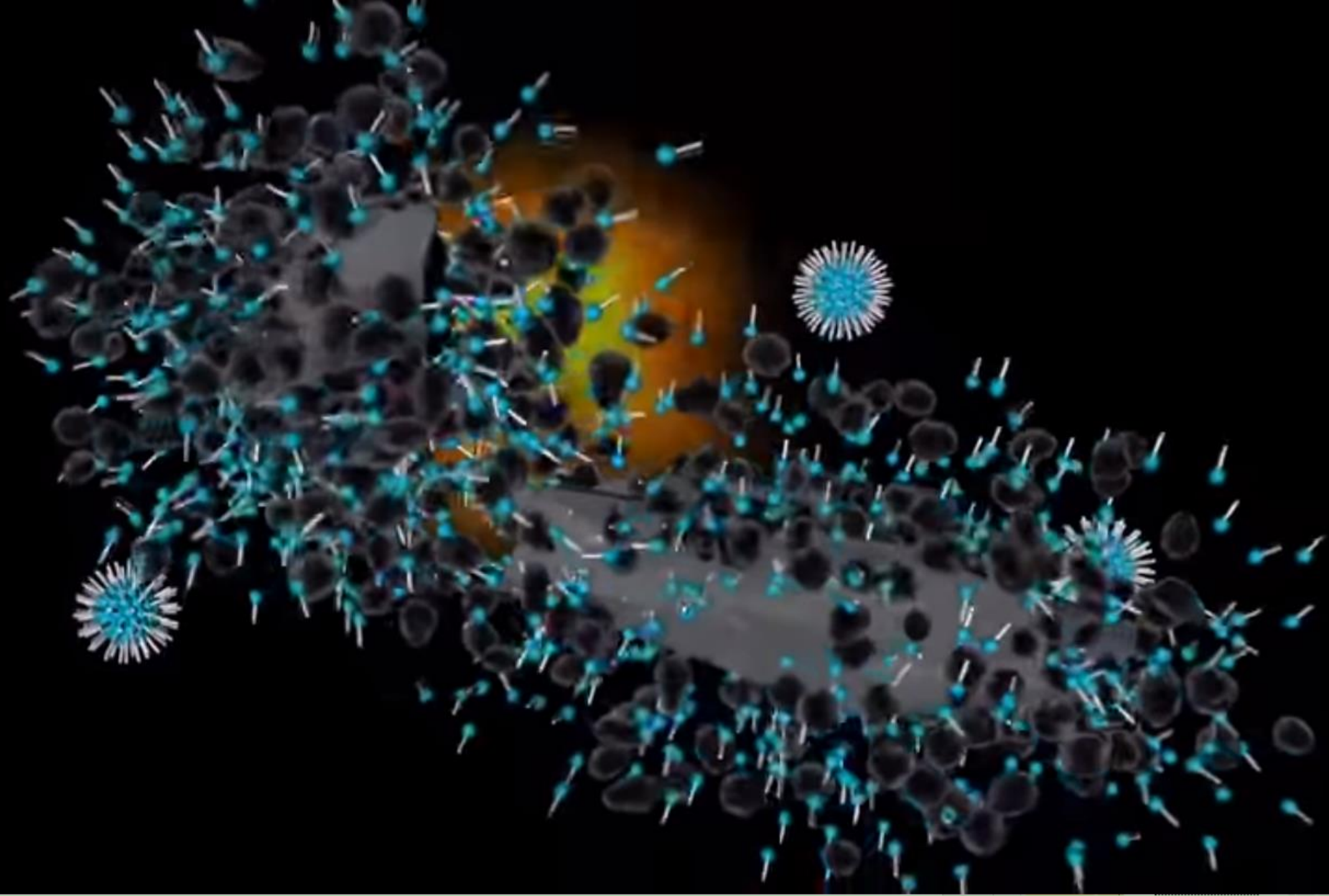


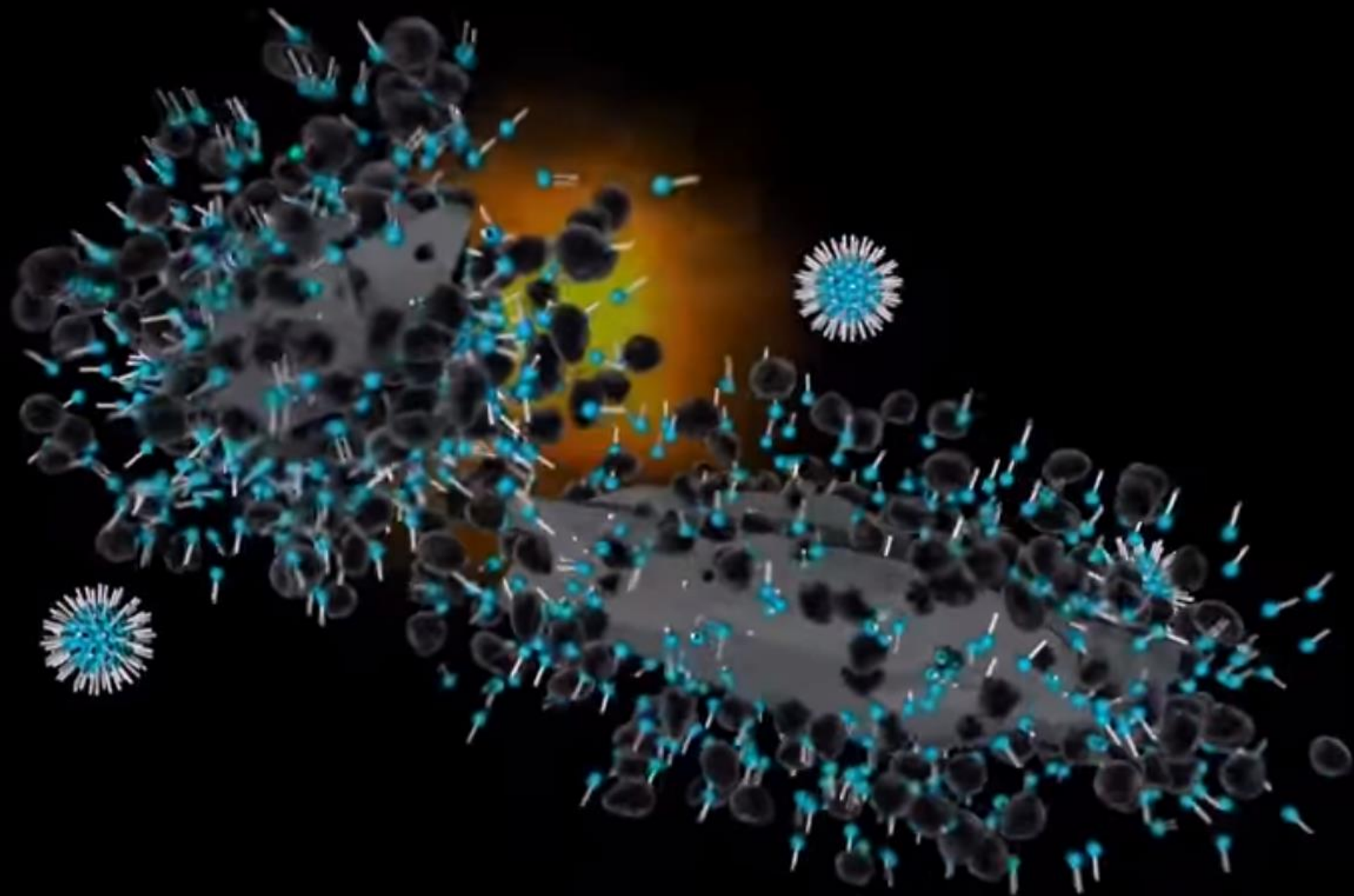


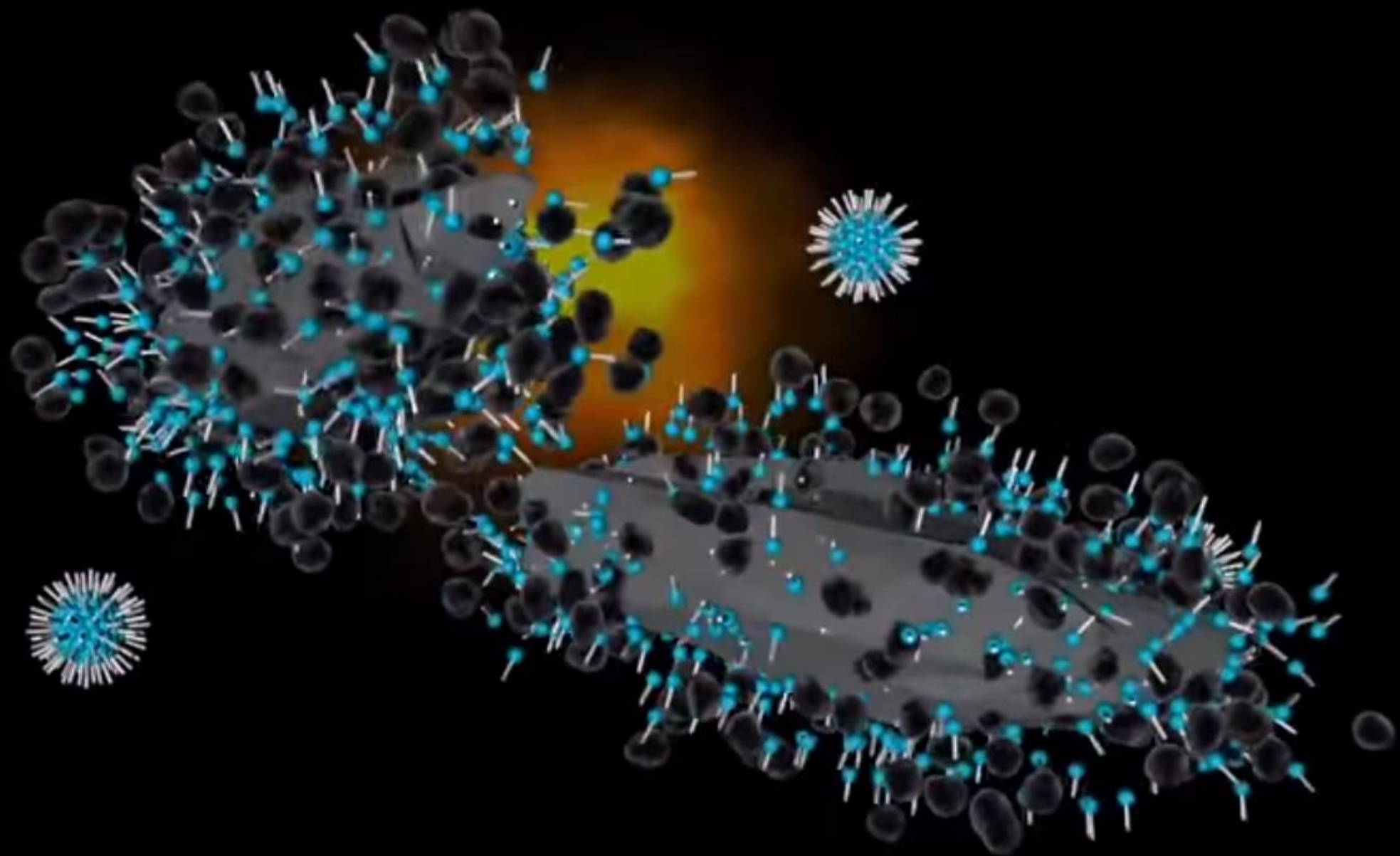


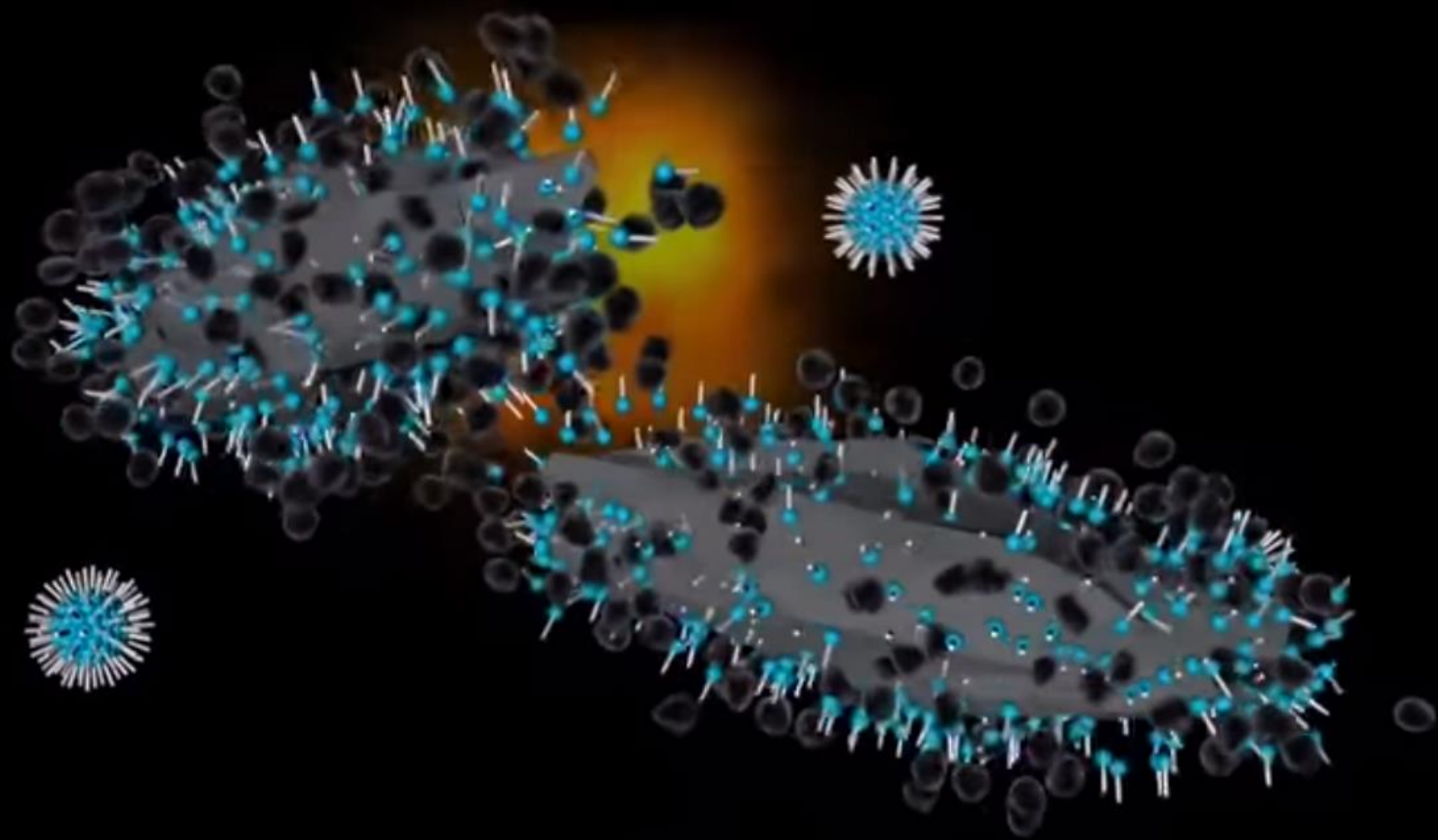


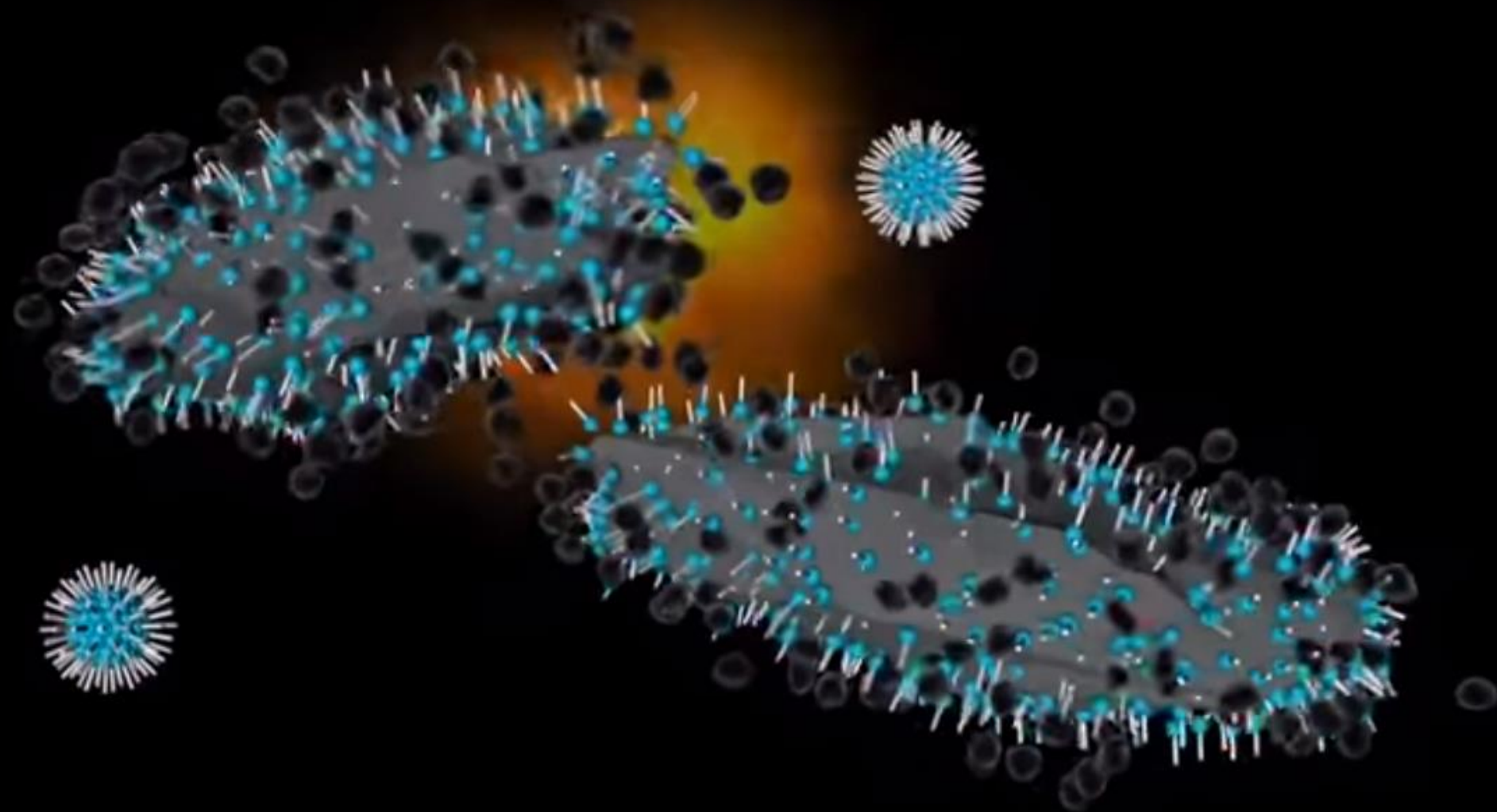


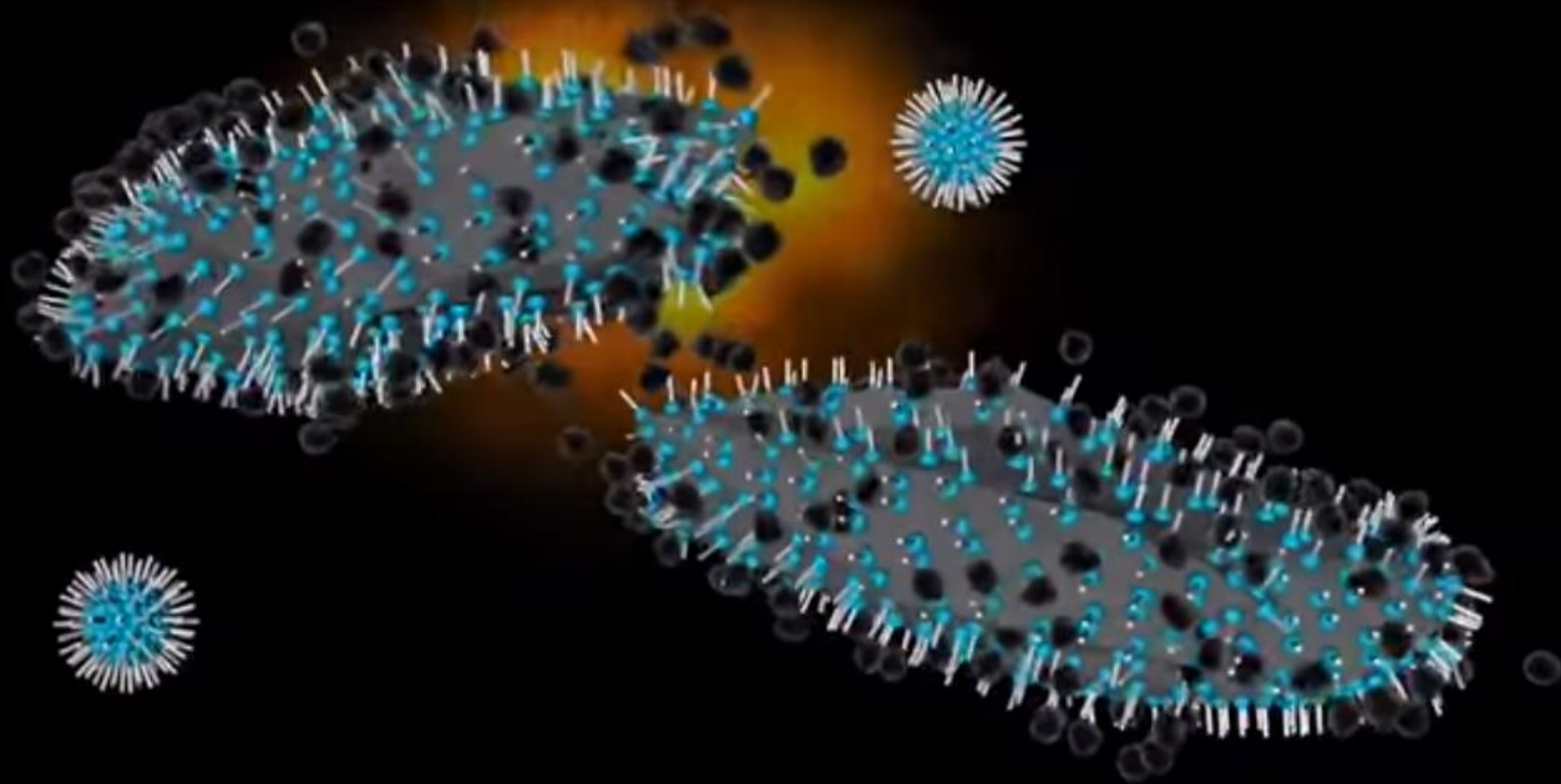


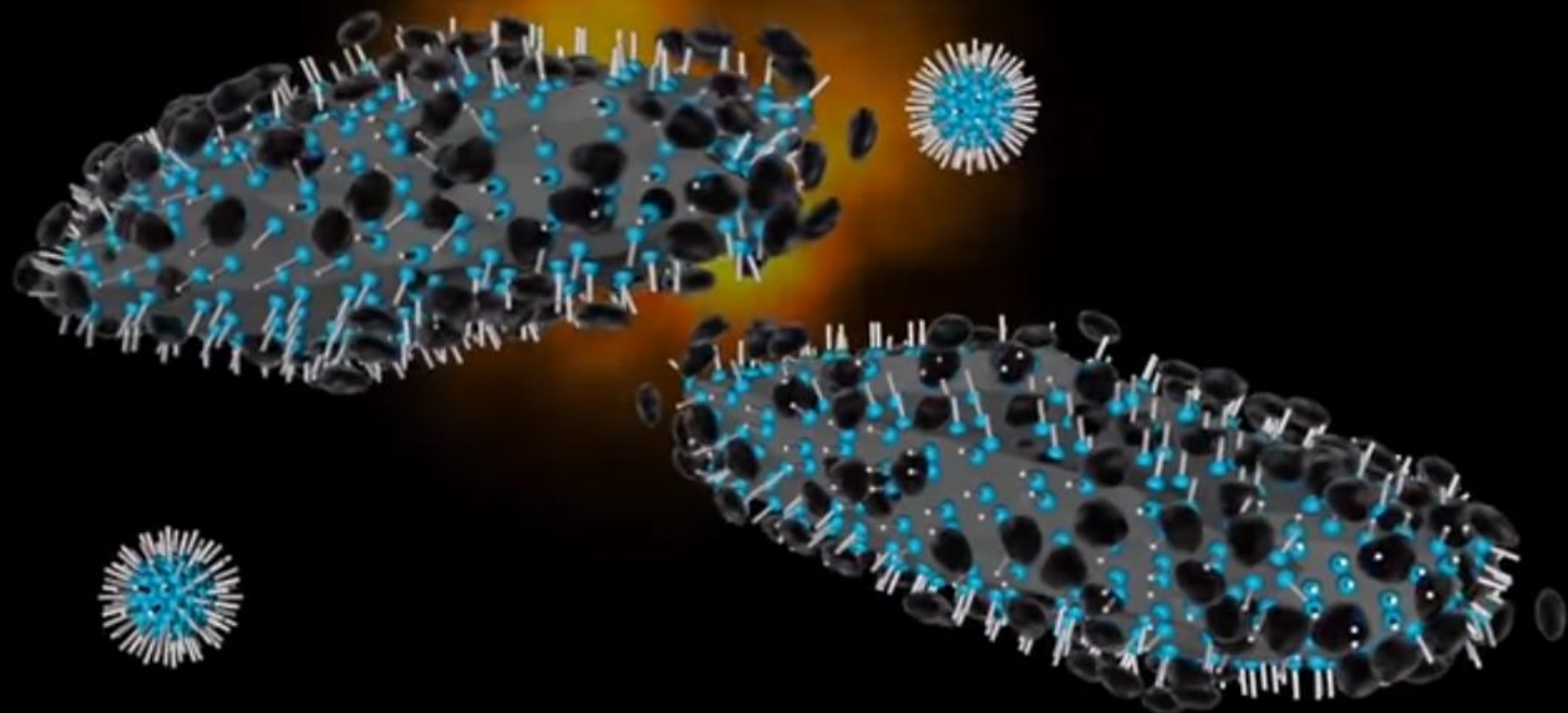


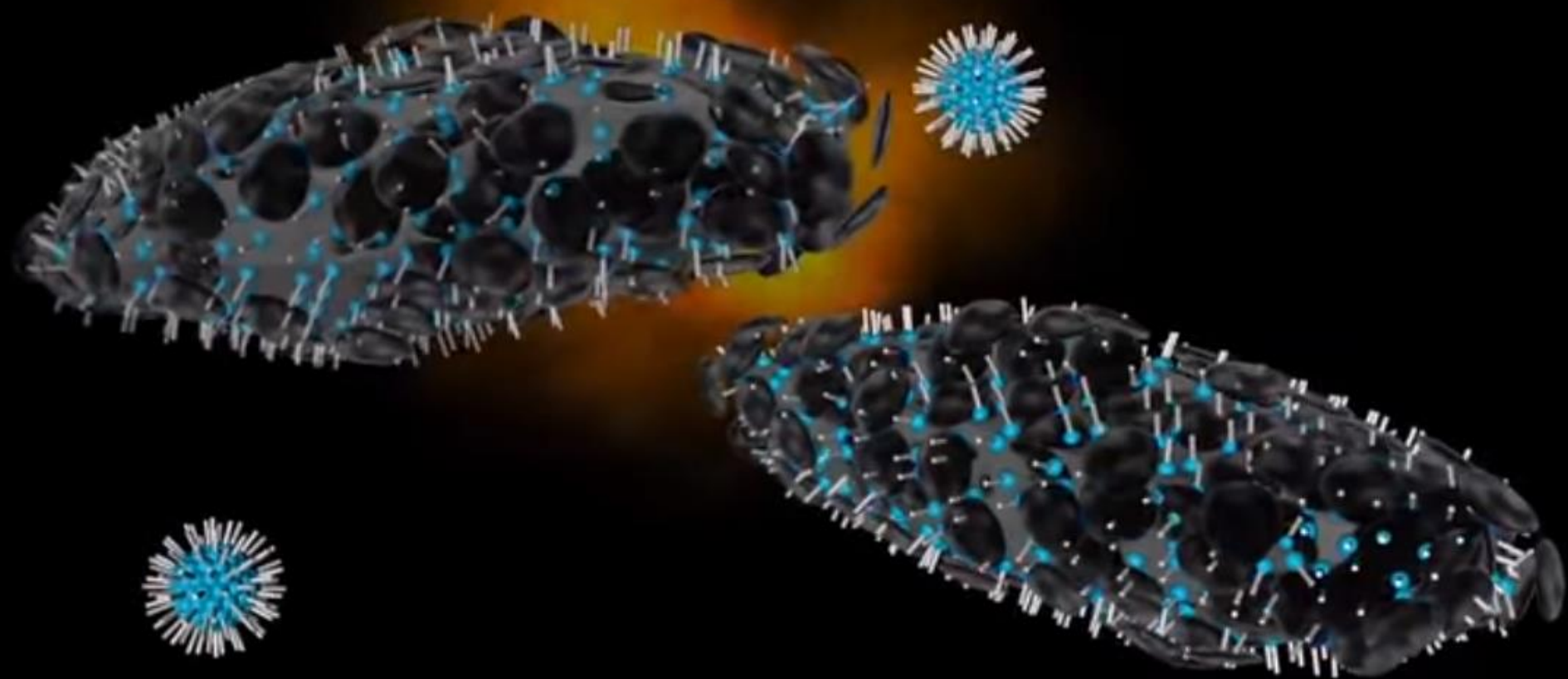


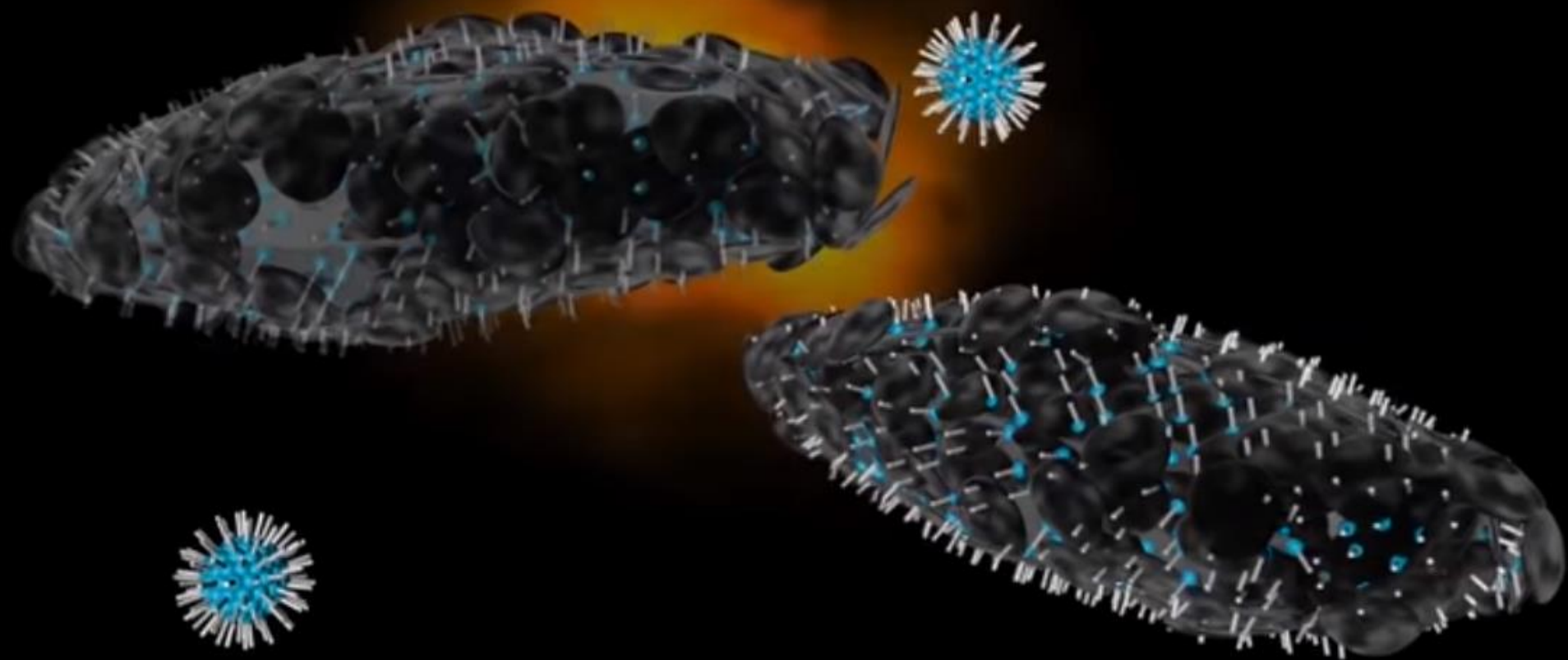


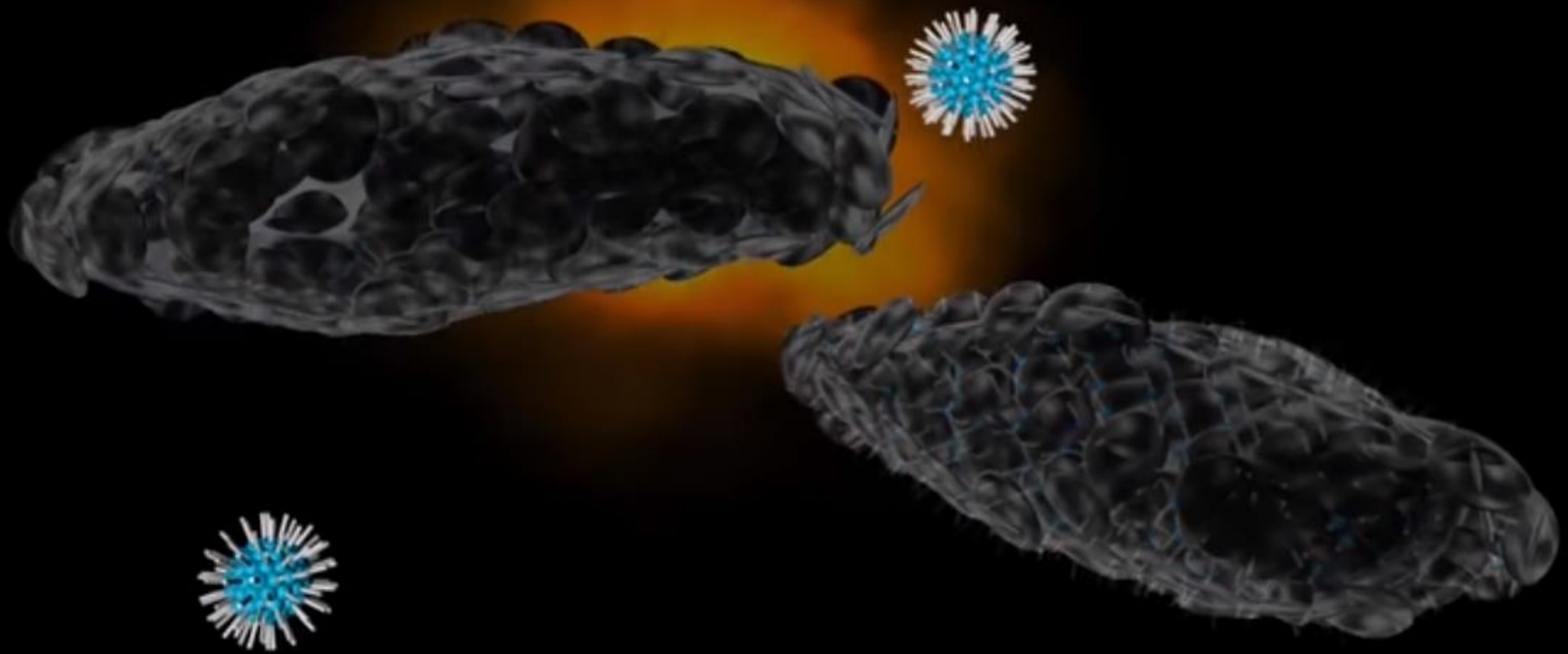


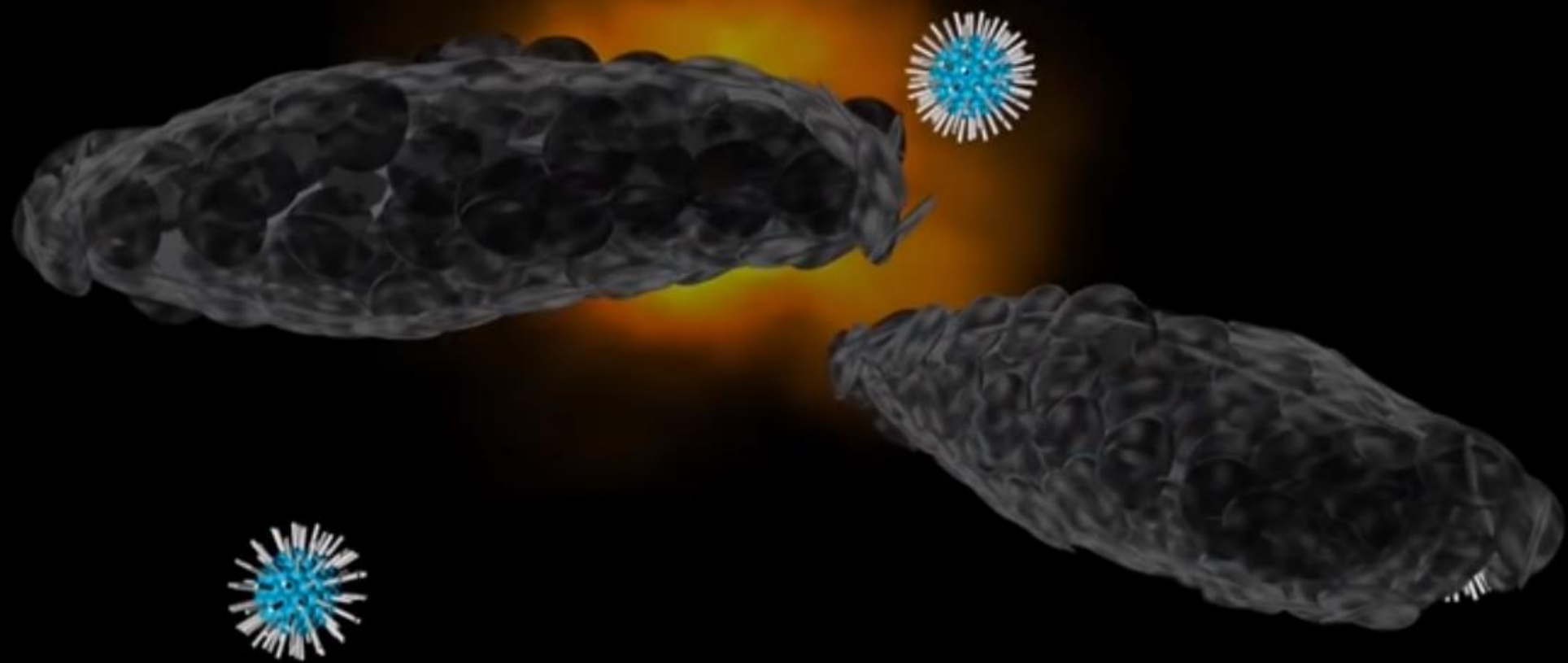


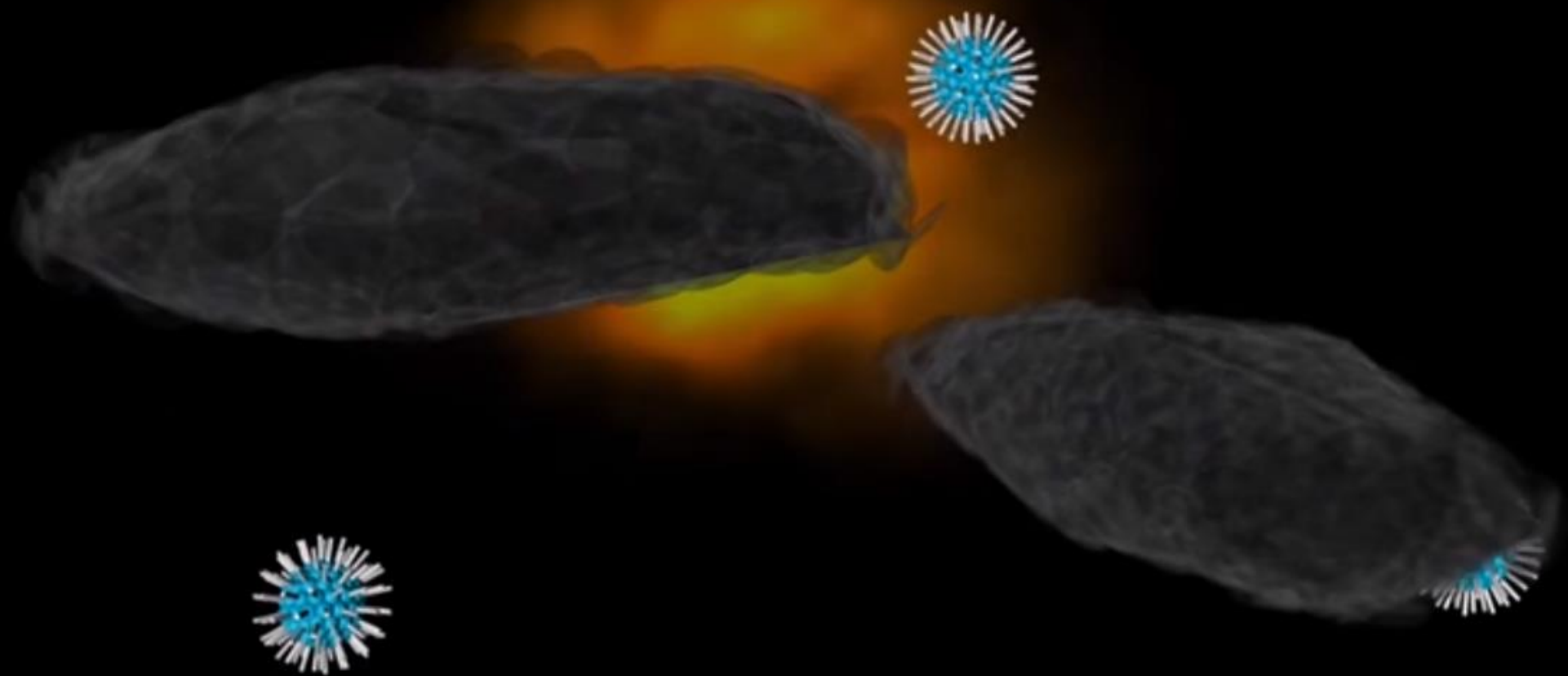


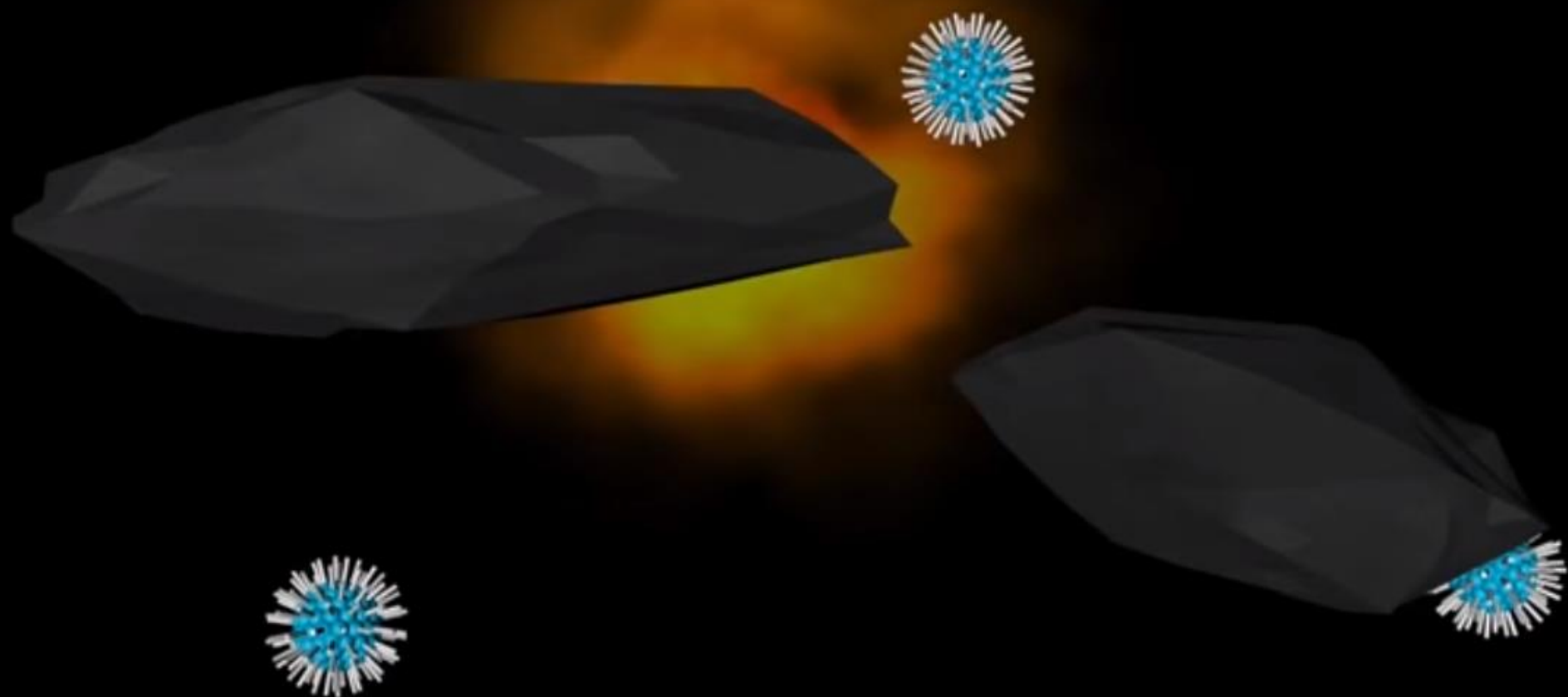










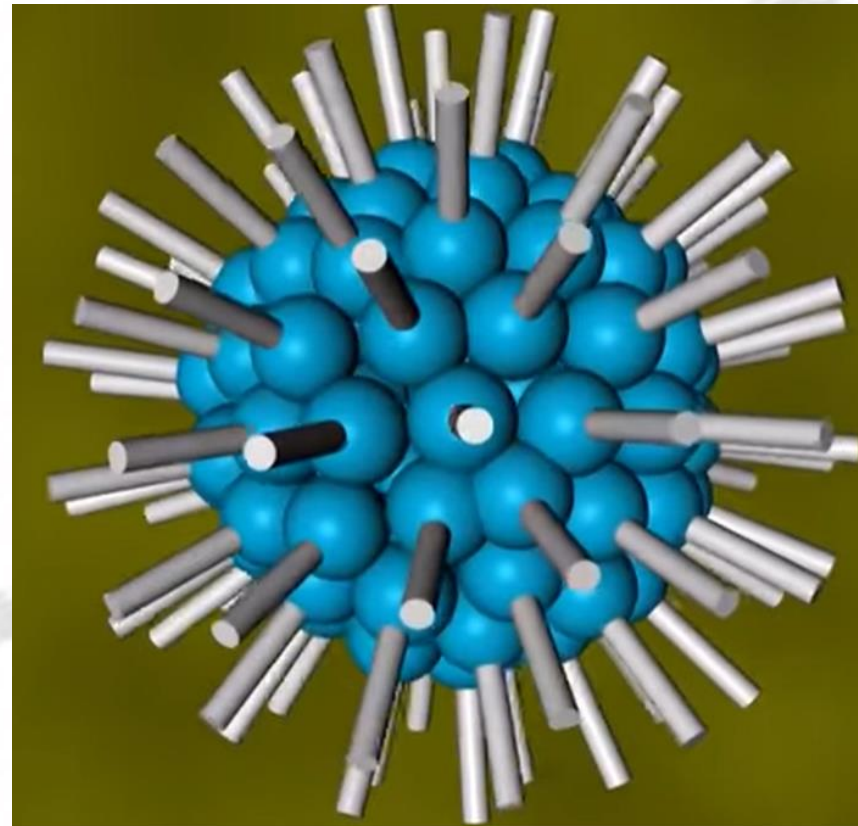


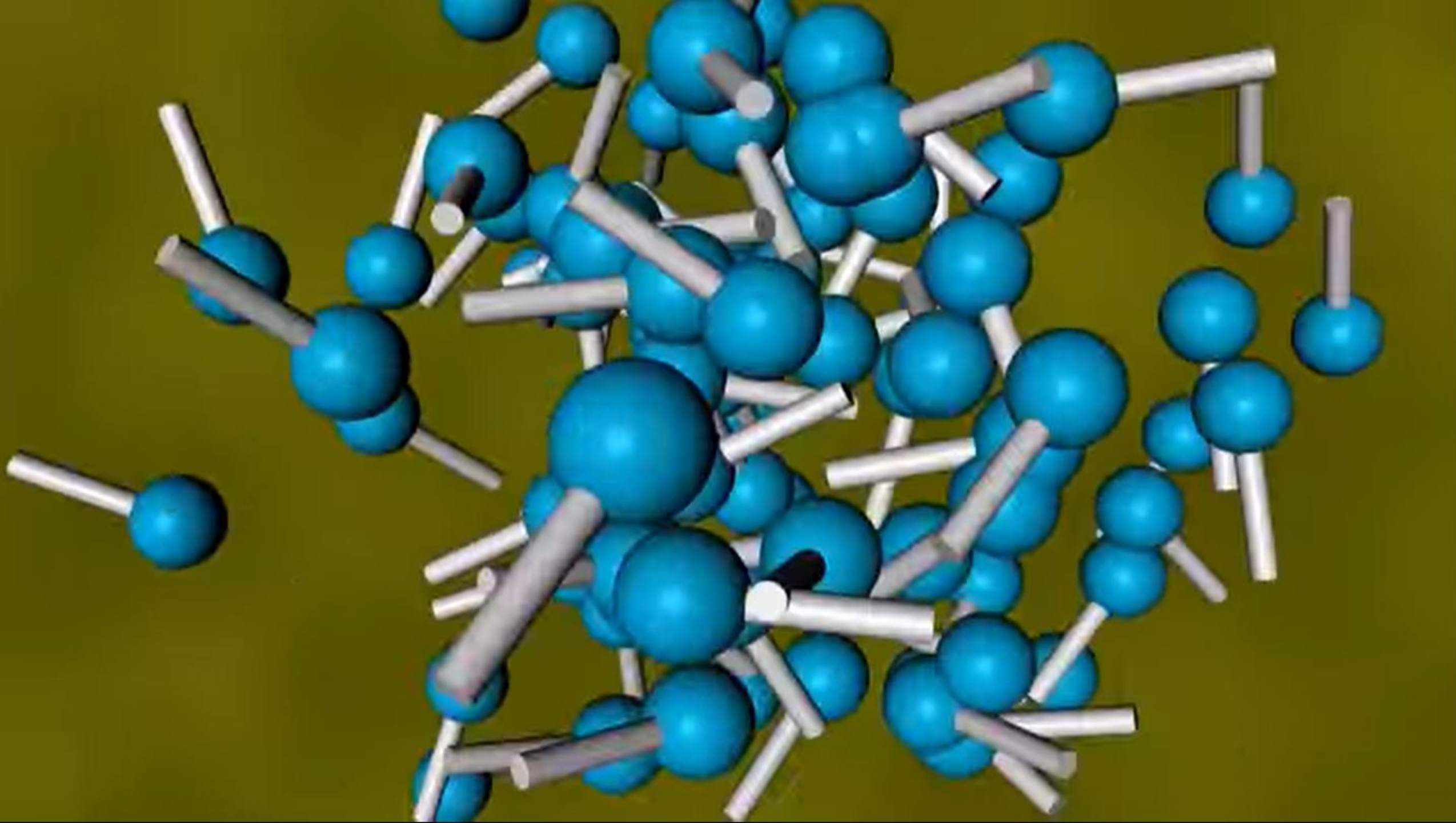


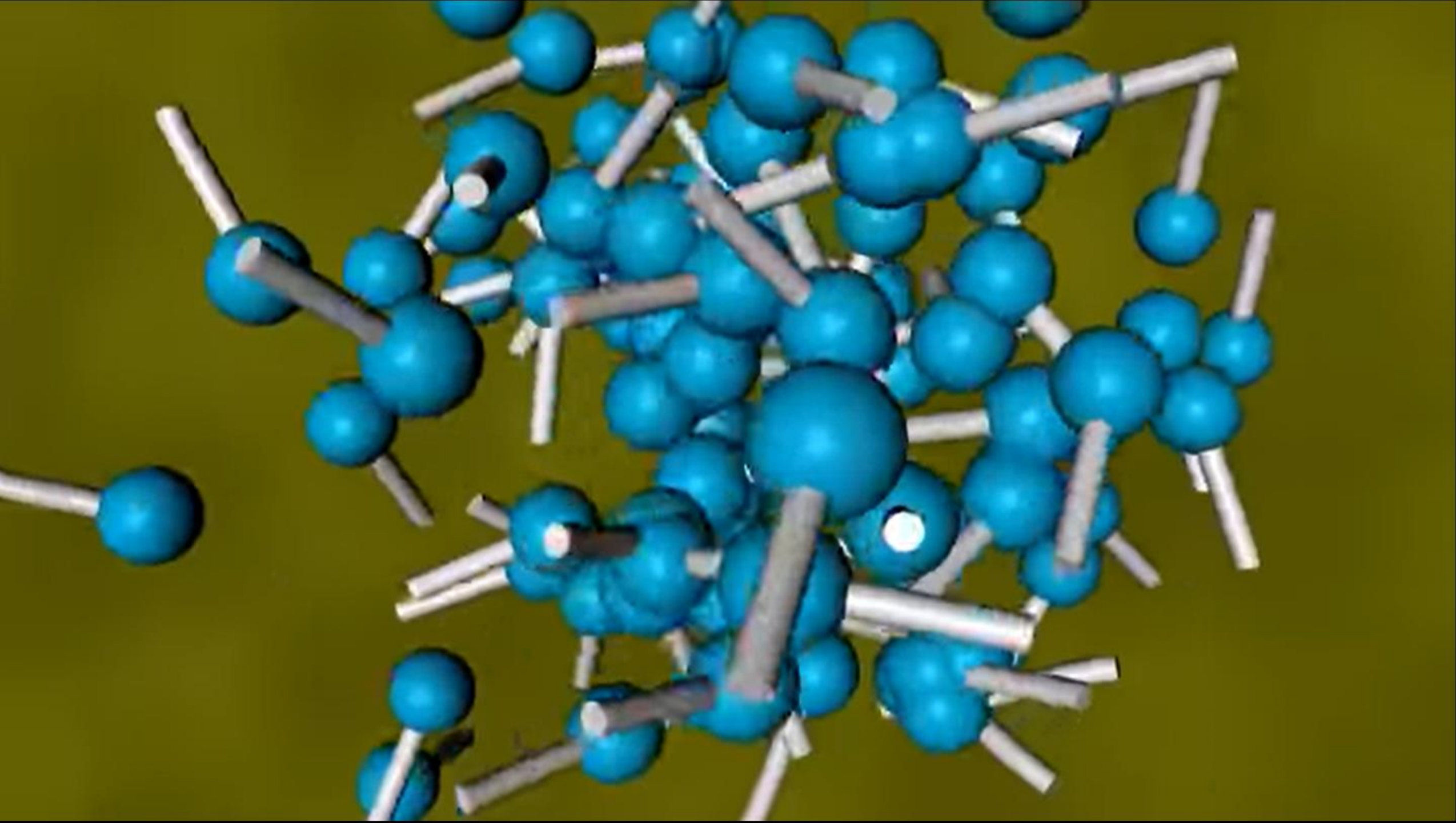
The diagram shows two dark, angular rock fragments on a black background. A bright, glowing orange and yellow area is positioned between the rocks, representing a heat source. Three spherical particles with blue centers and white spiky exteriors are shown: one above the left rock, one below the left rock, and one attached to the right rock. A white text box with black text is located in the lower-left quadrant.

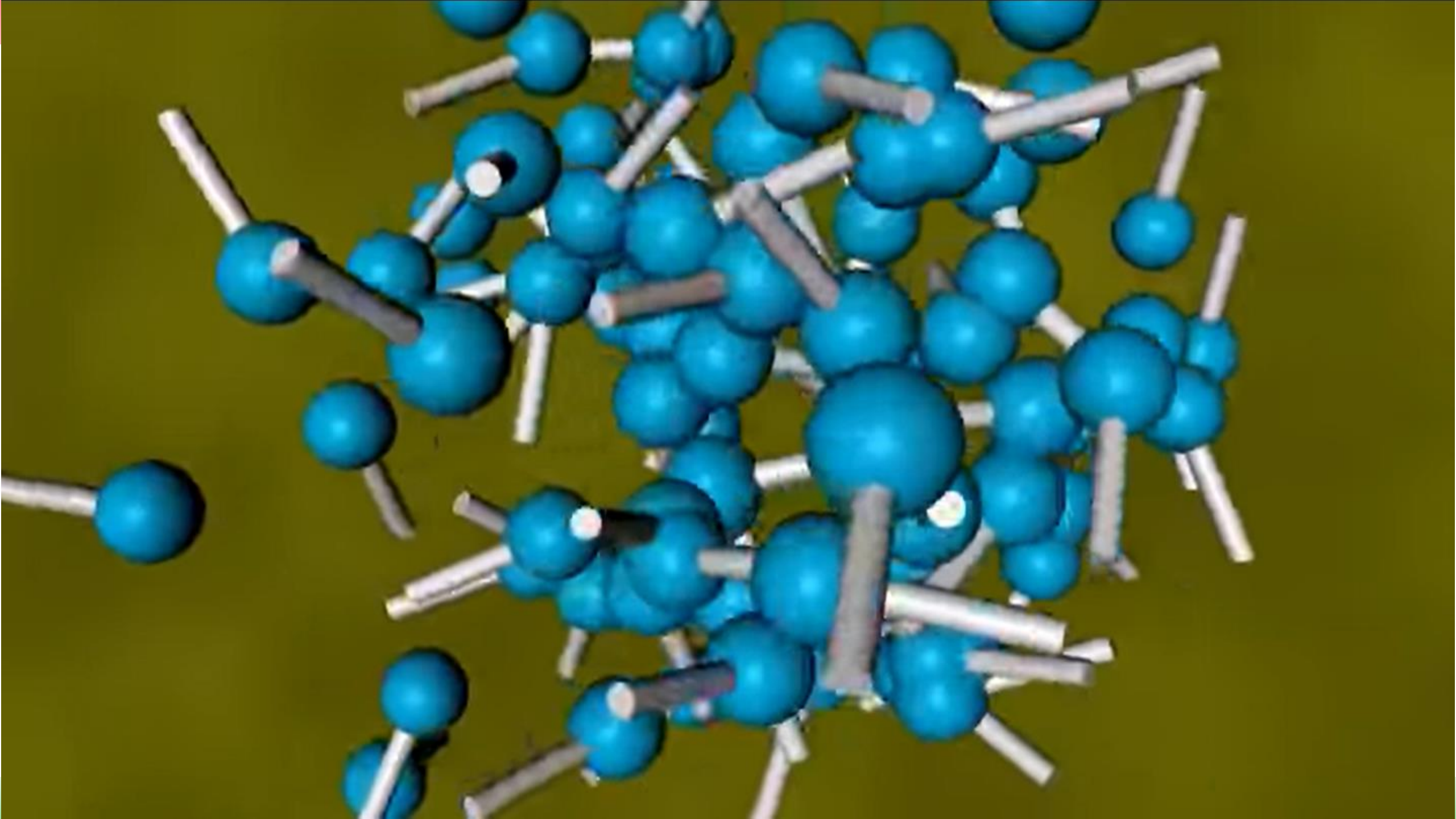
**bitumentumhülltes Gestein auch
bei niedrigerer Mischtemperatur**

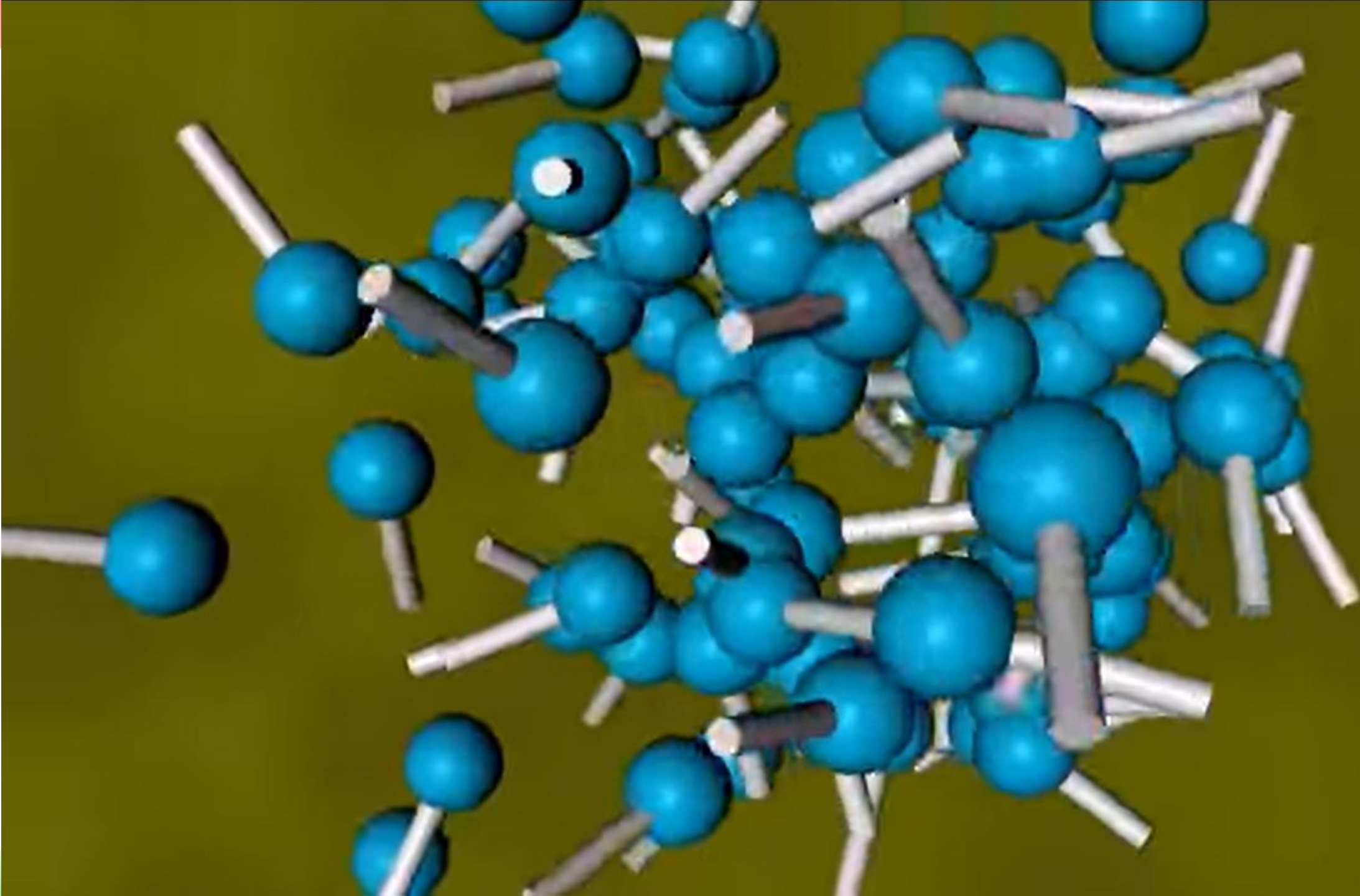
Mizellenbildung

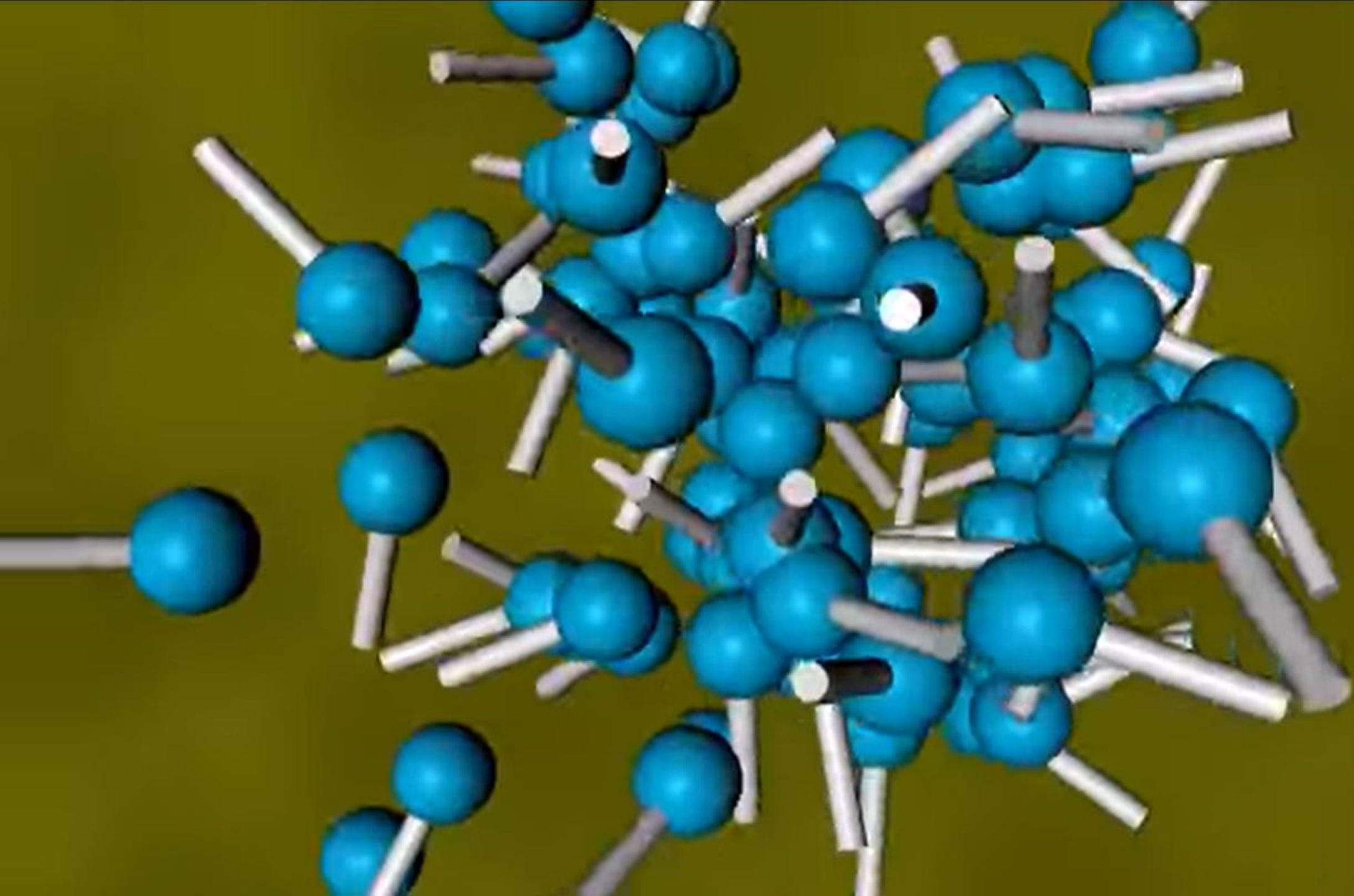


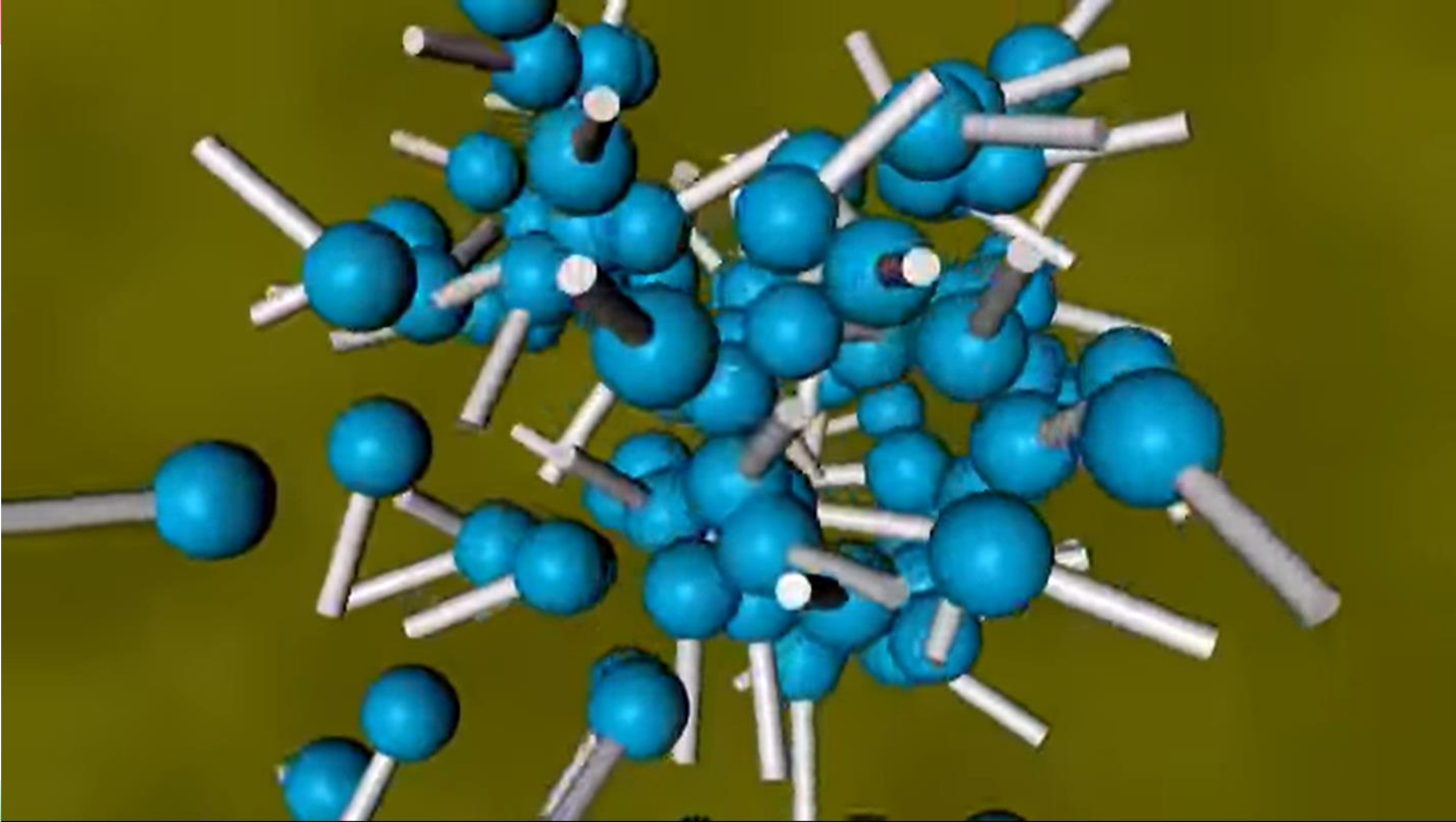


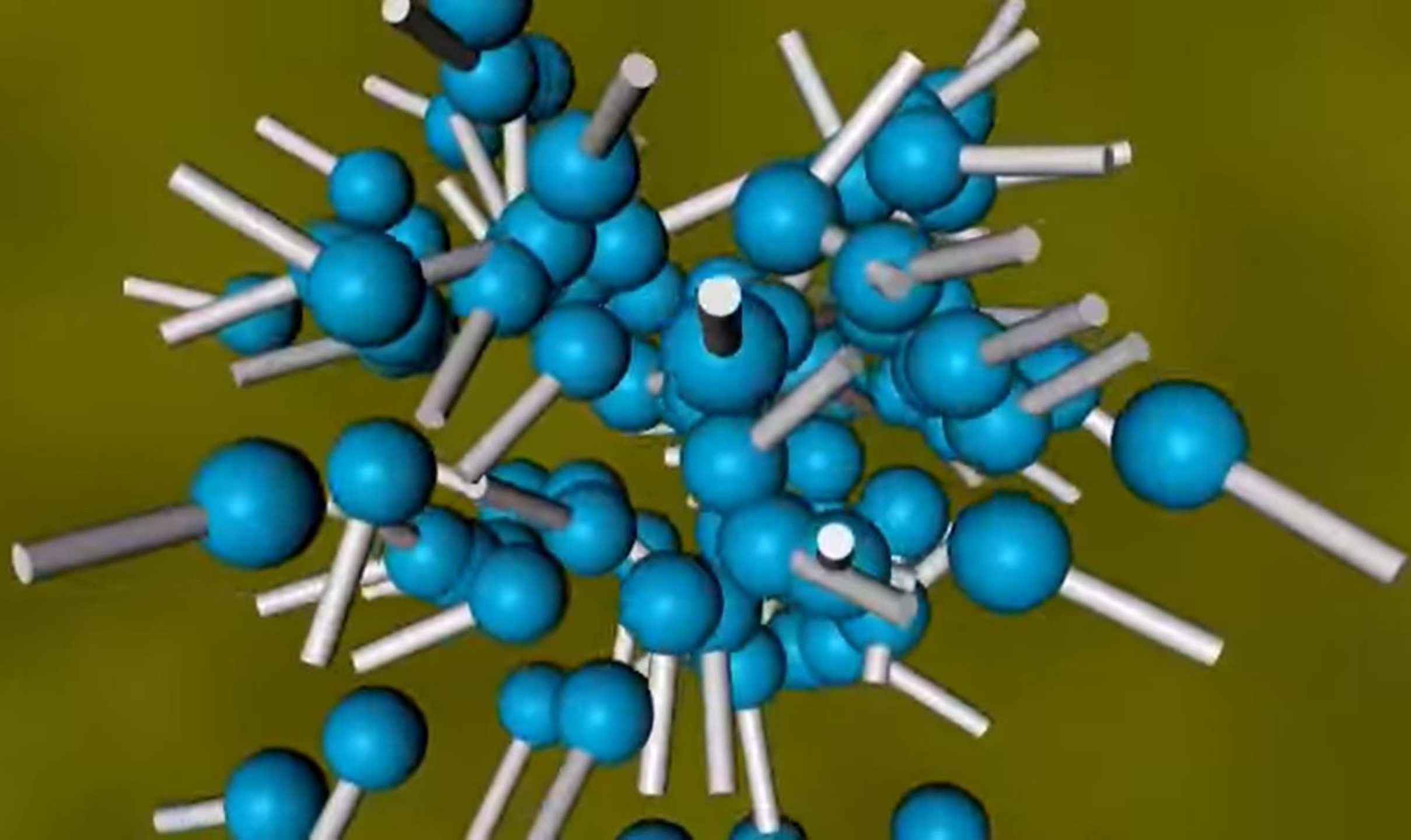


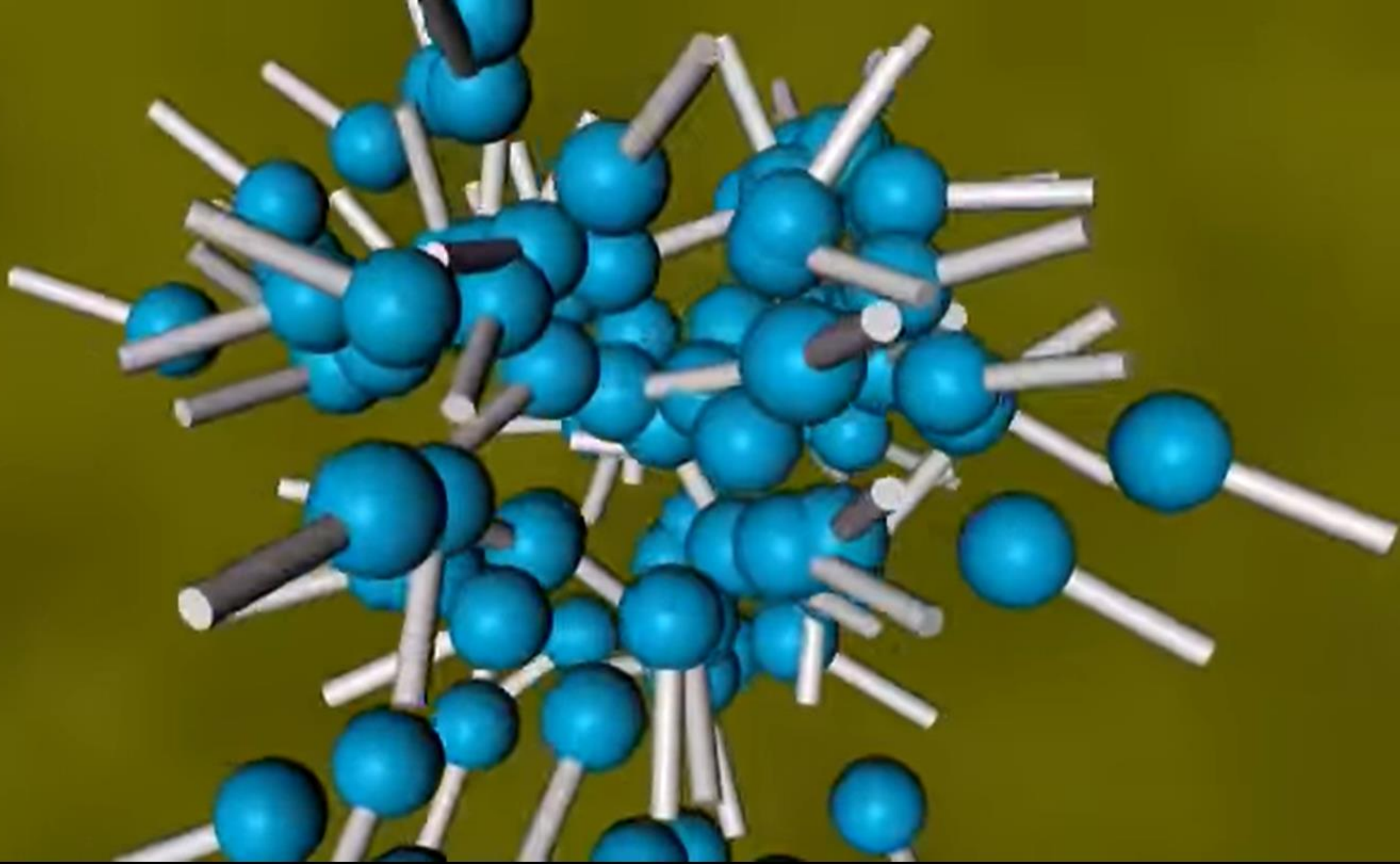


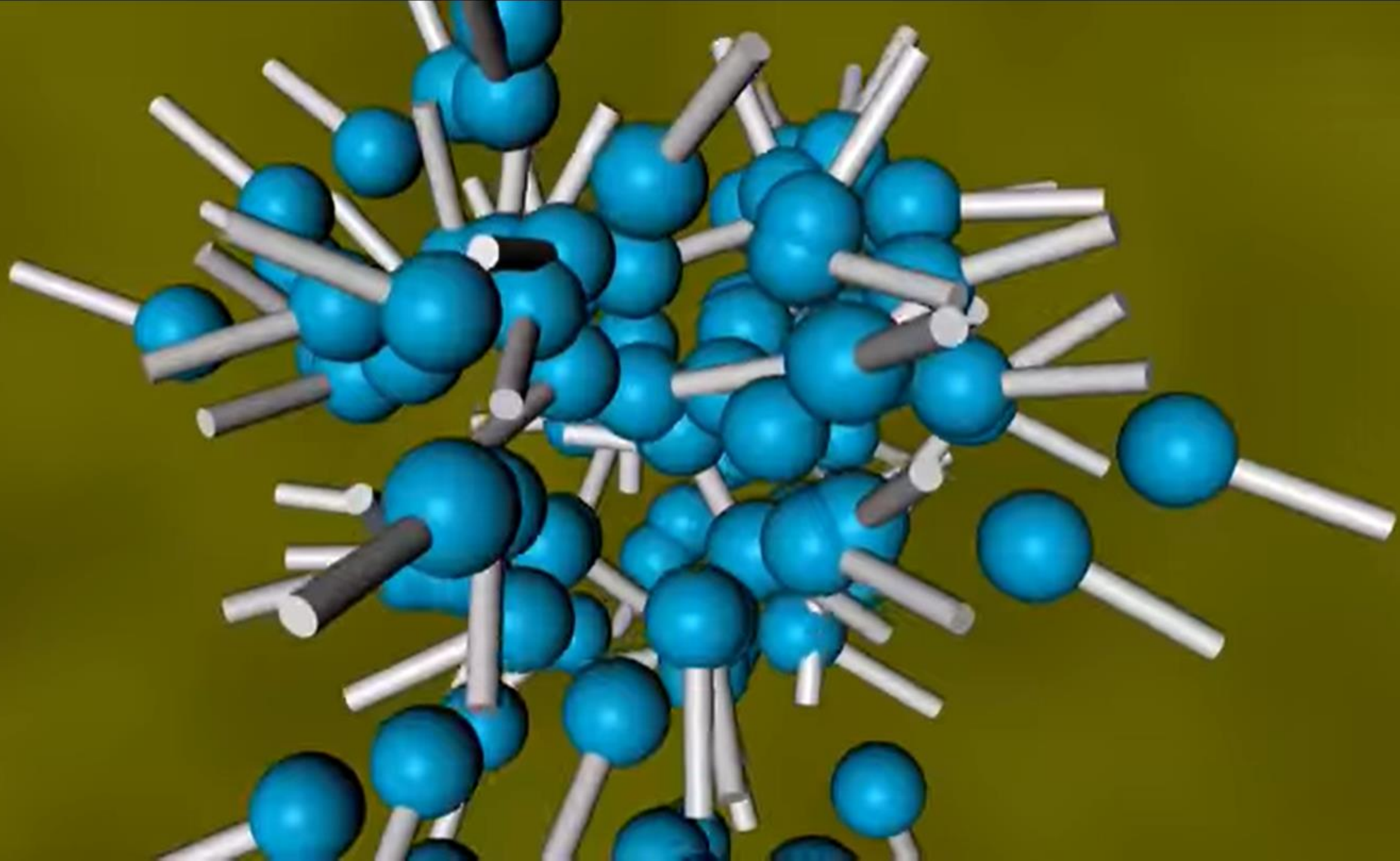


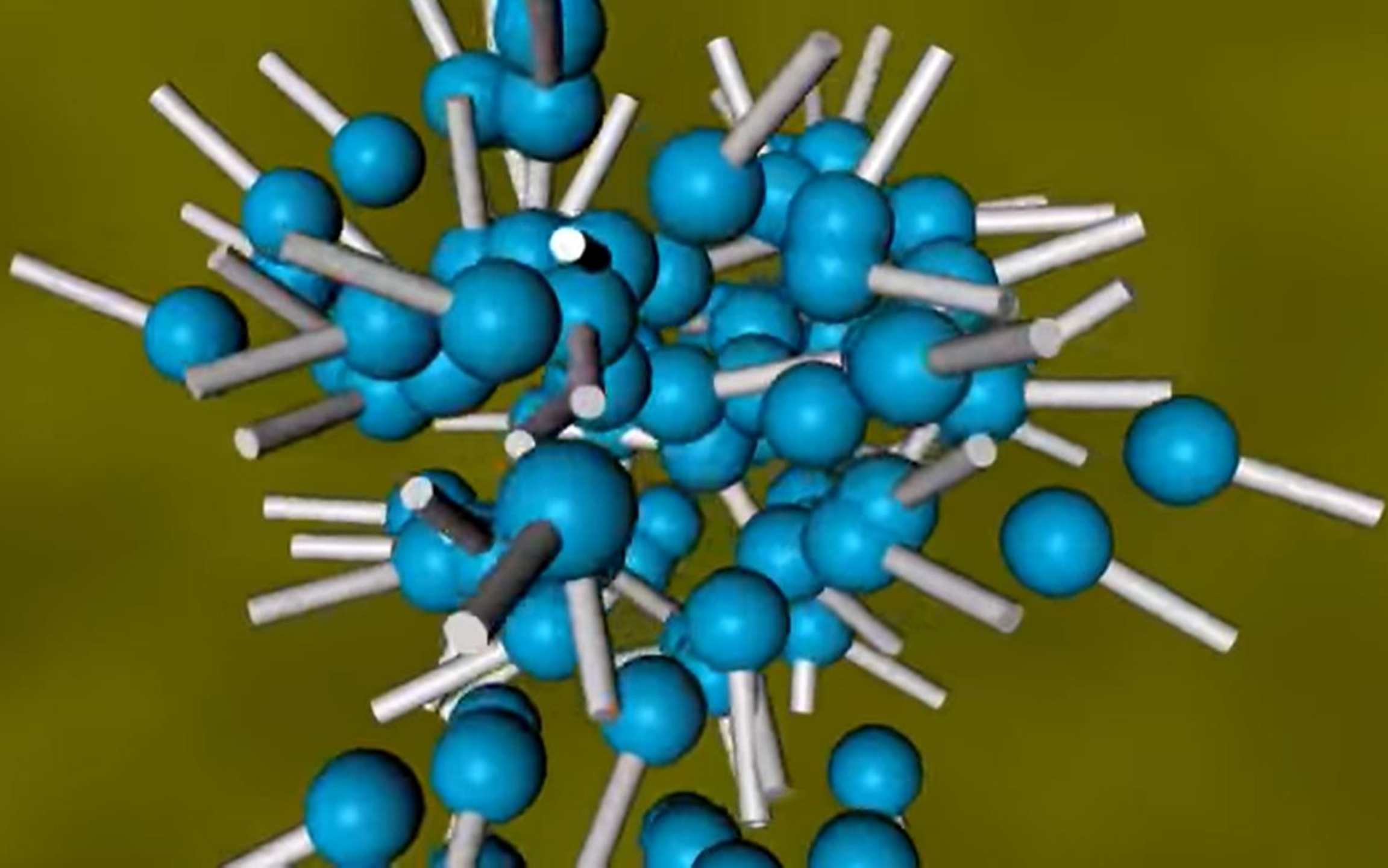


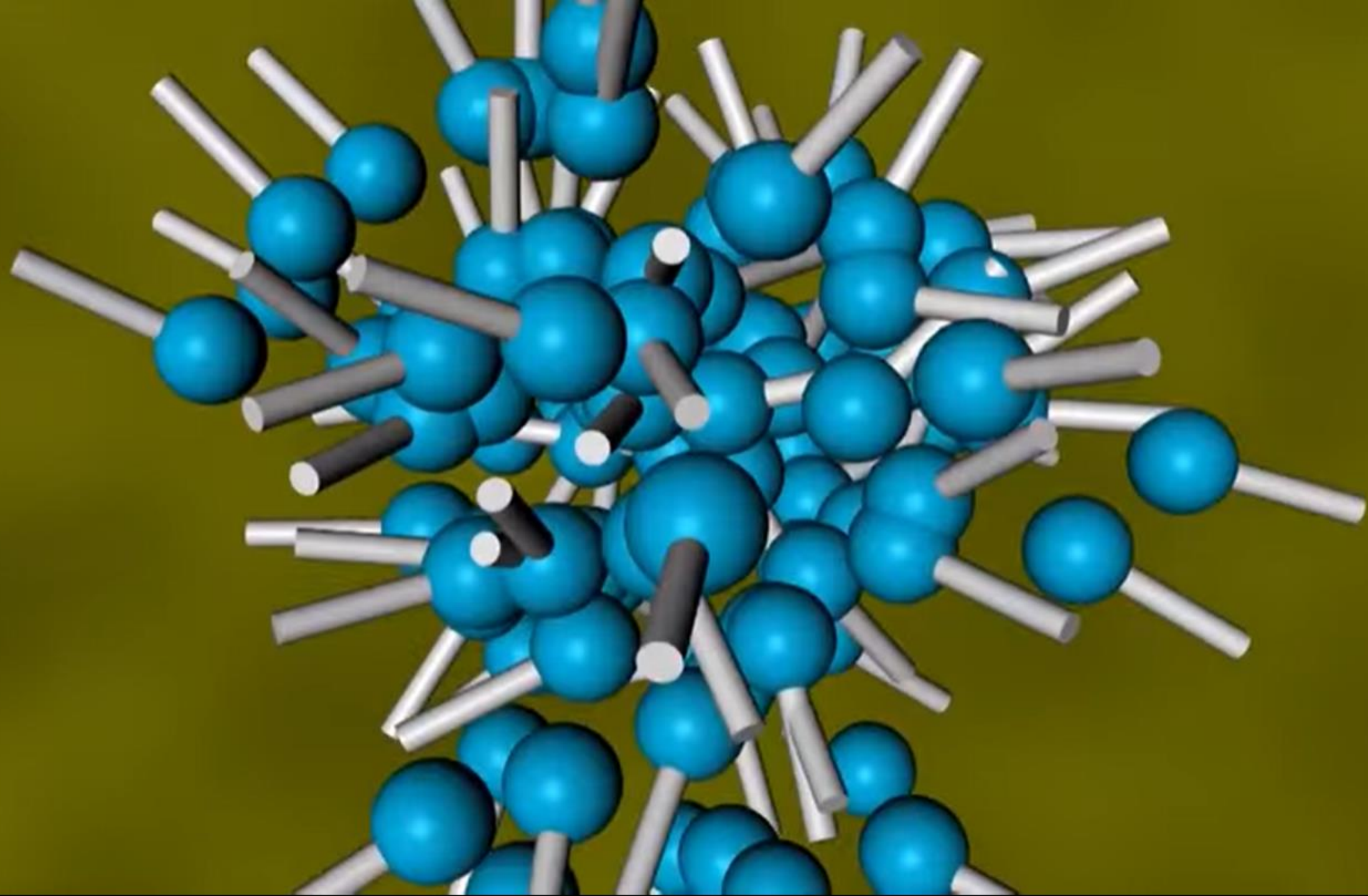


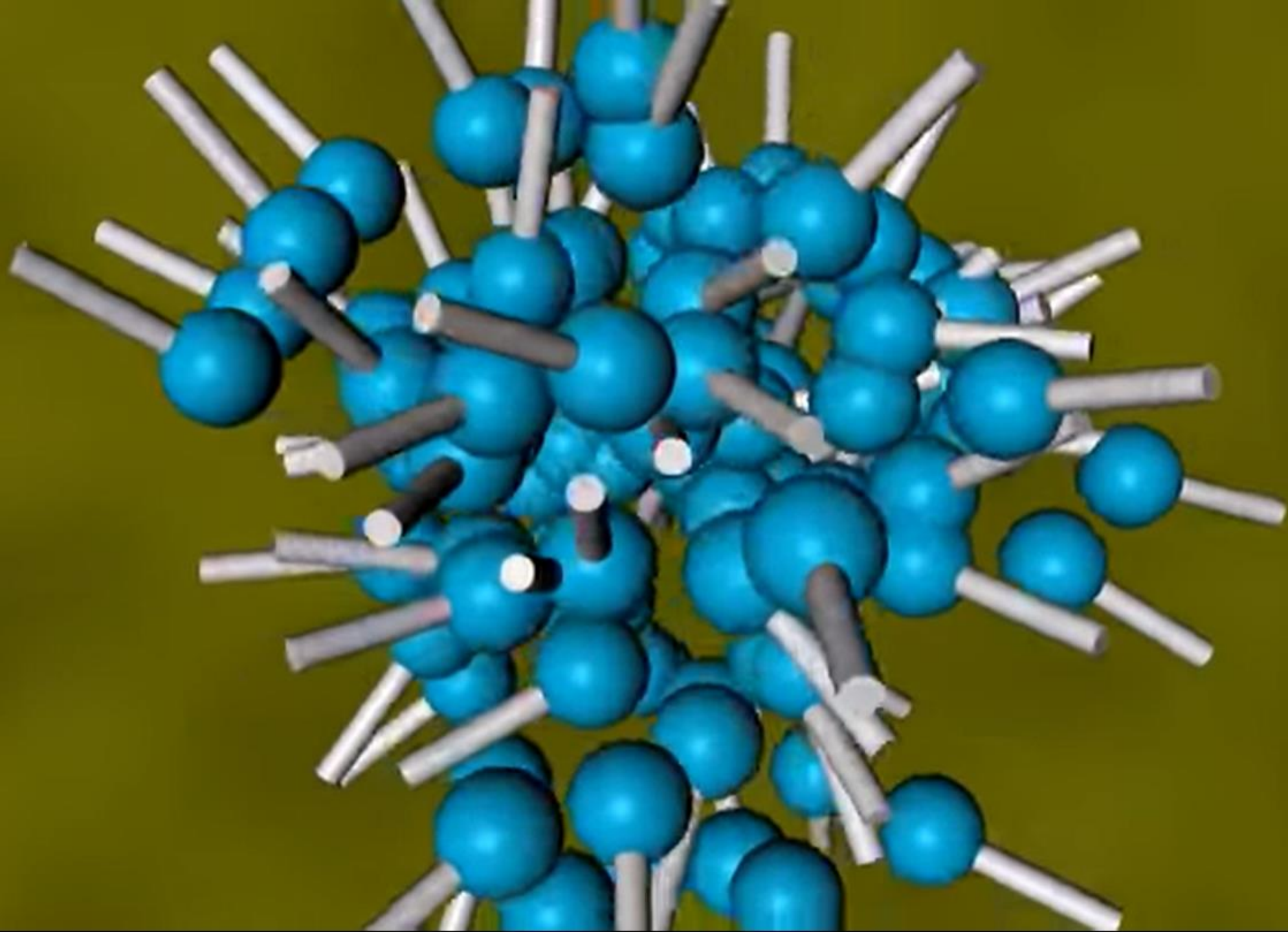


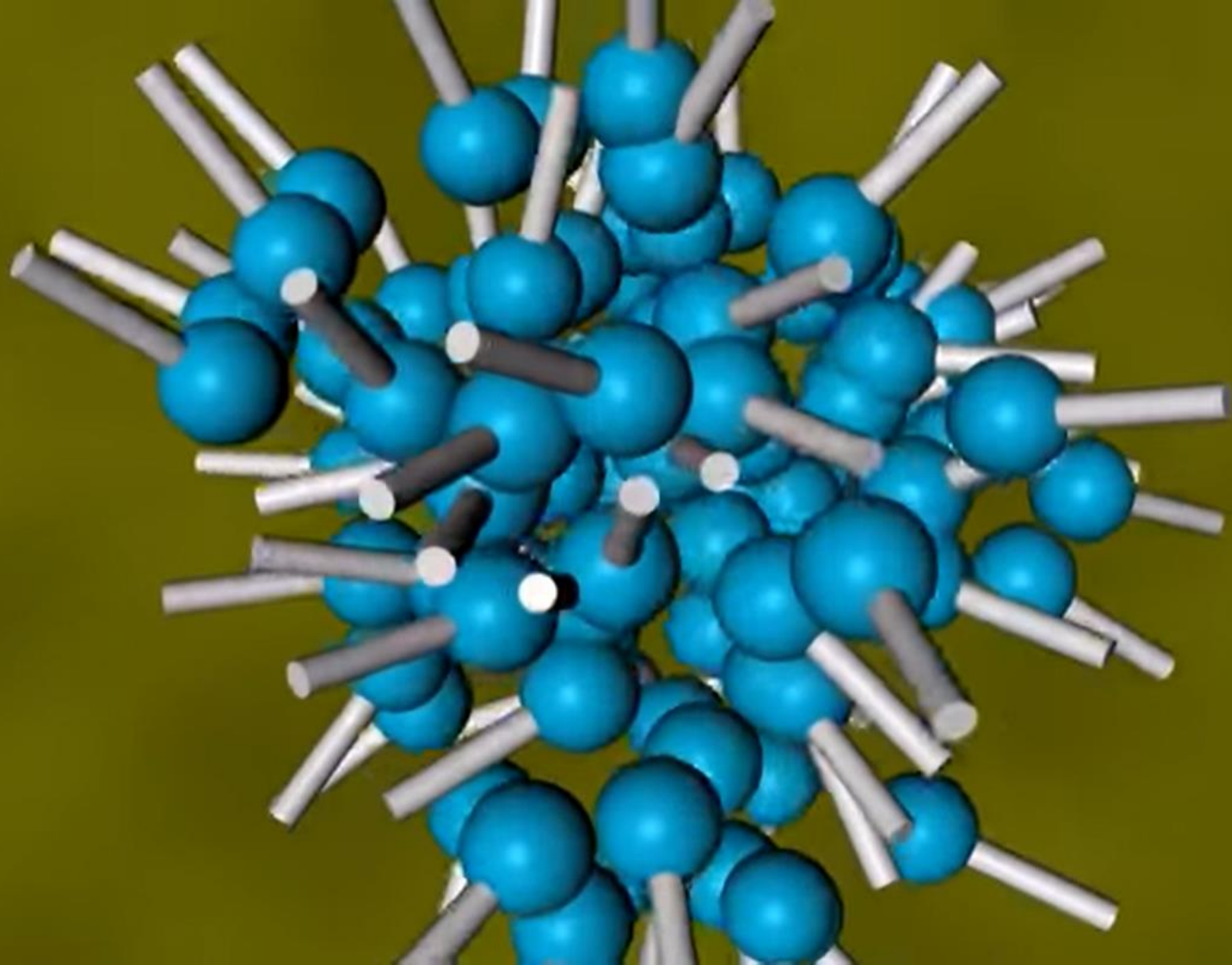


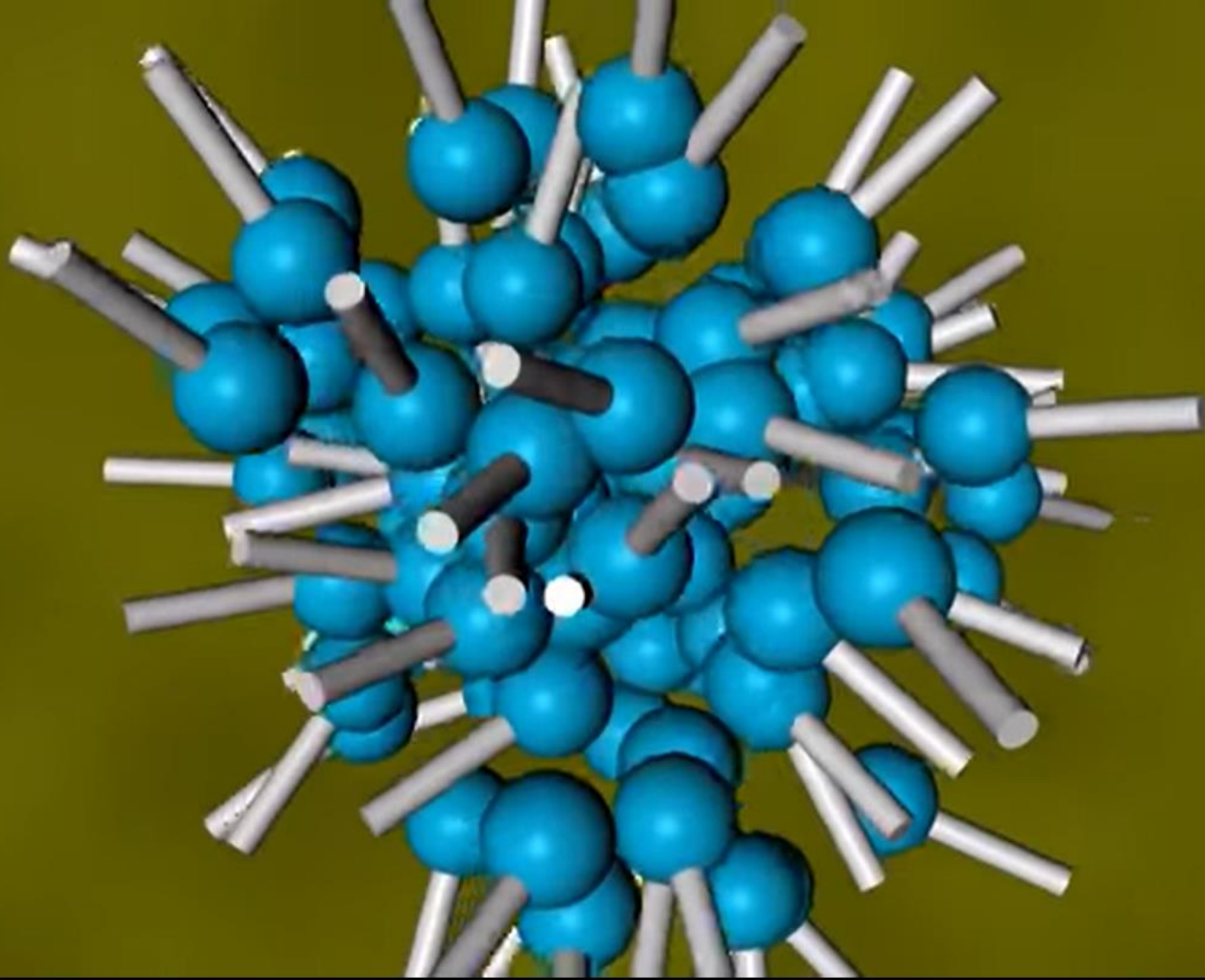


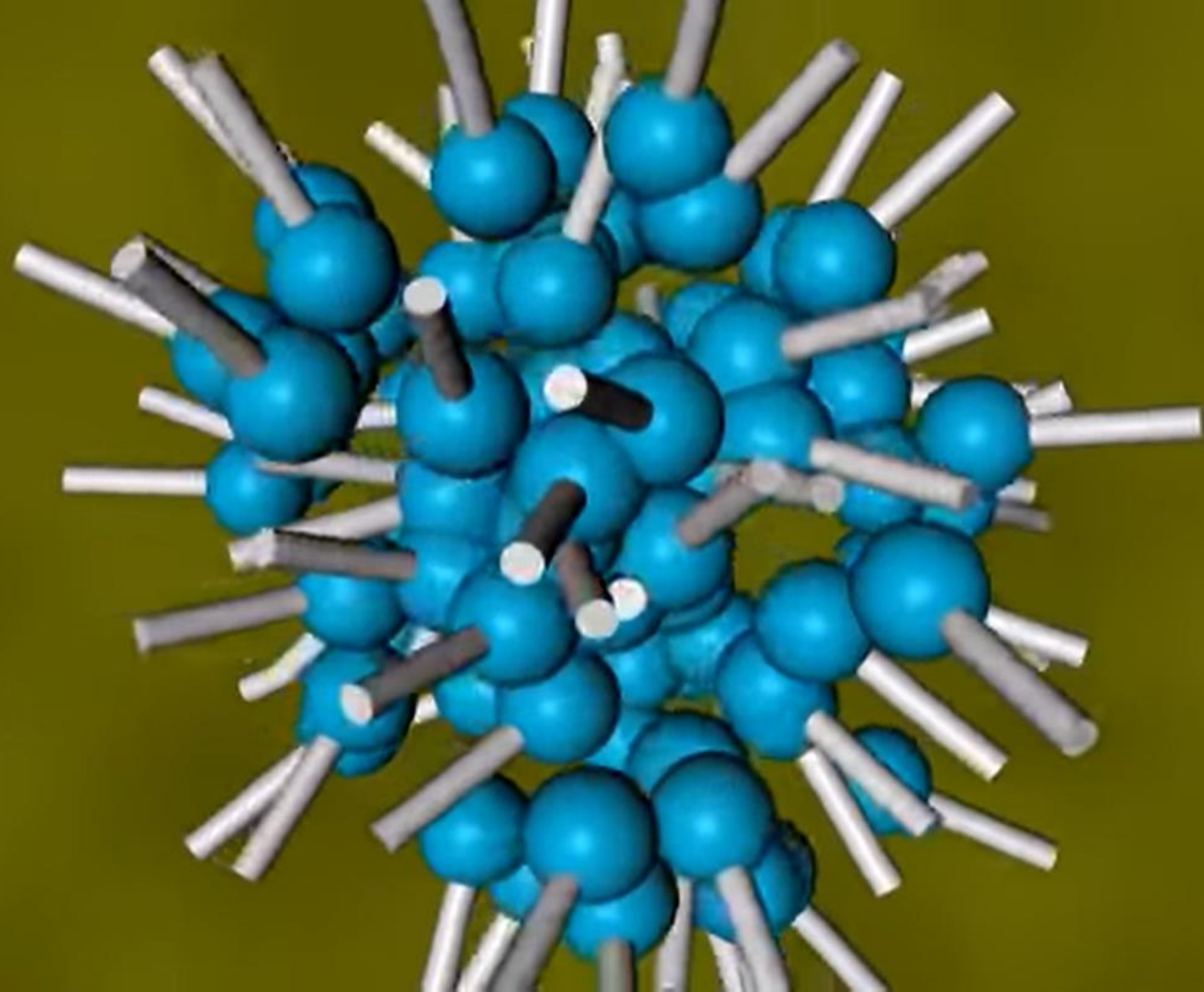


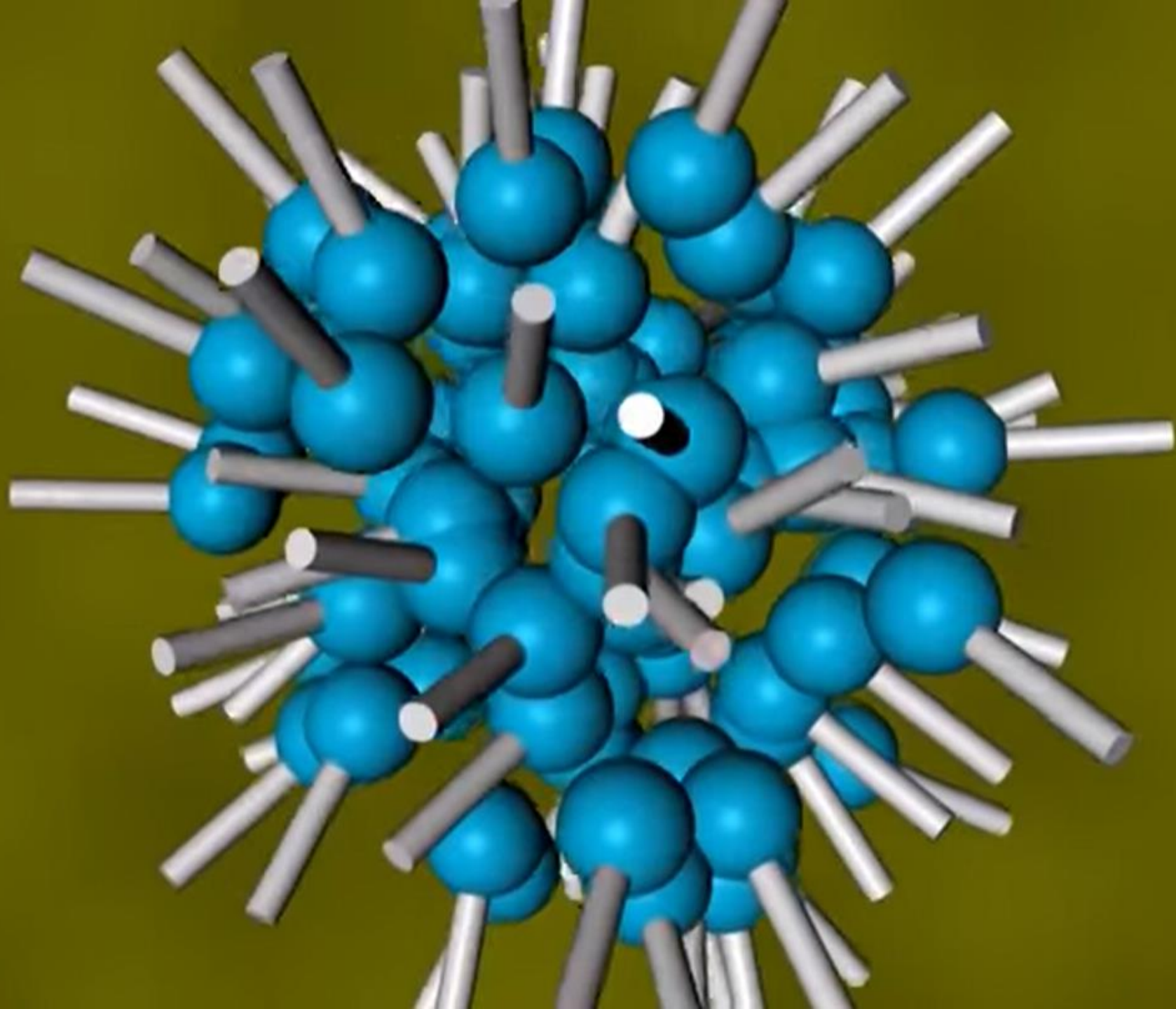


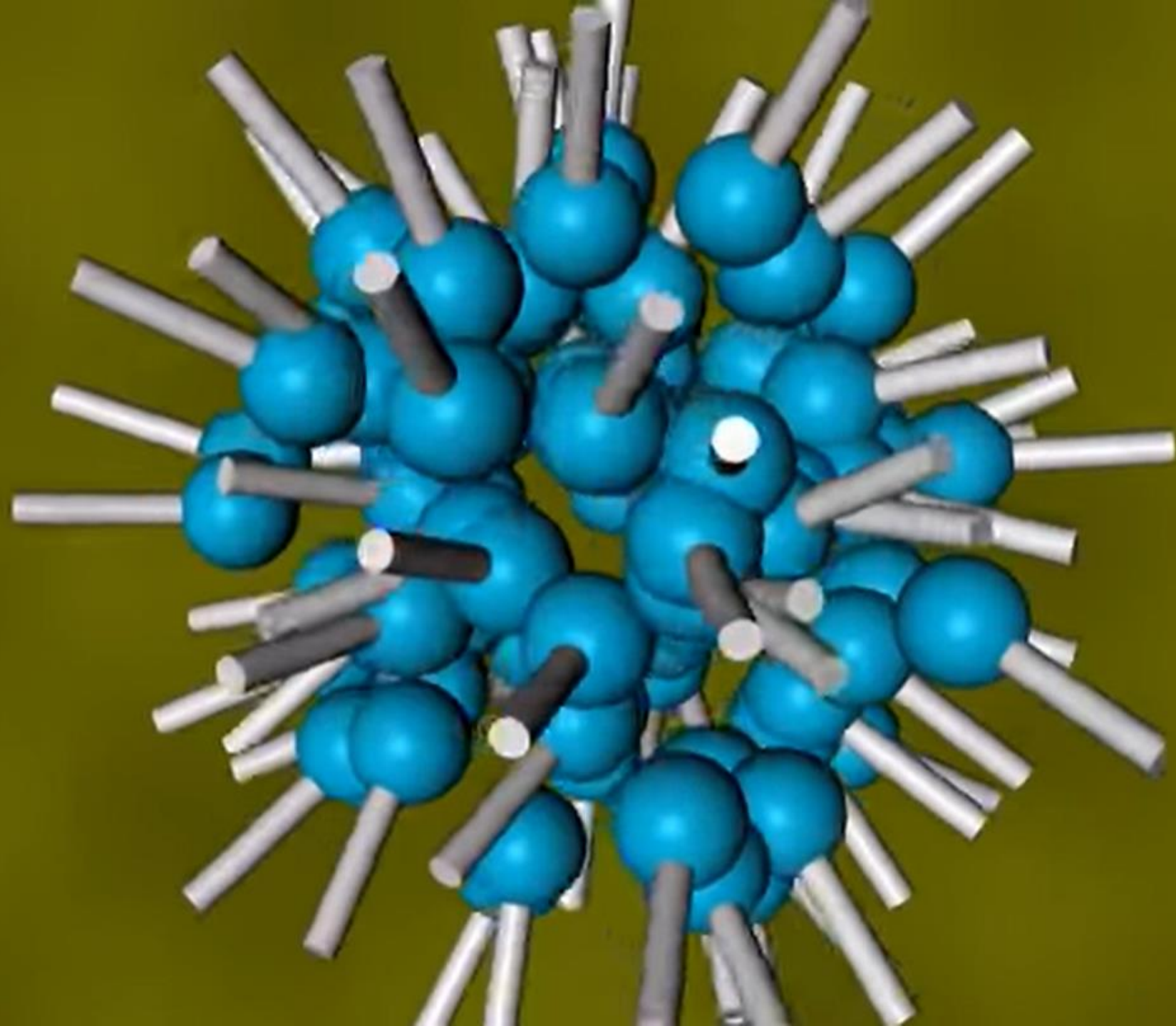


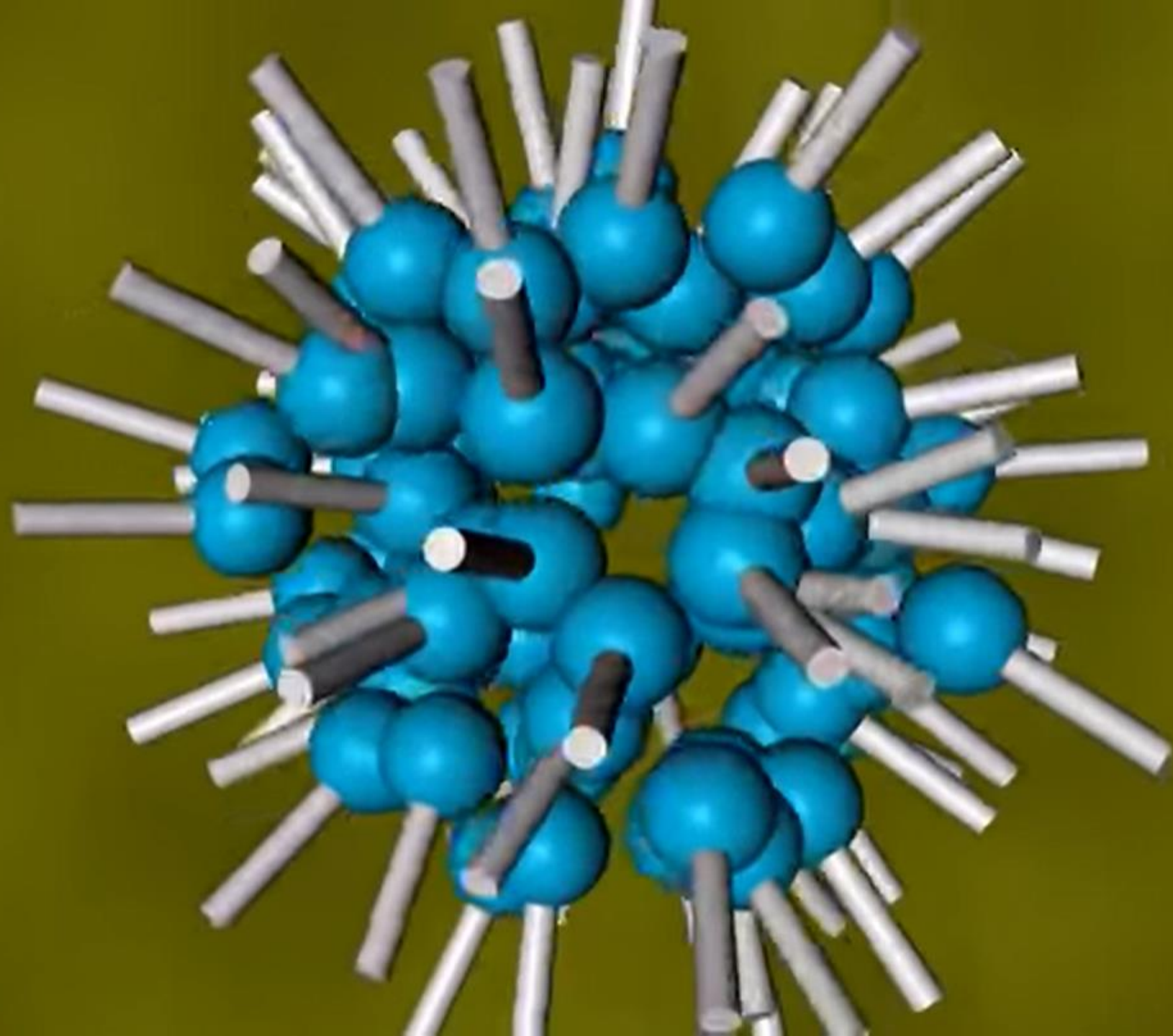


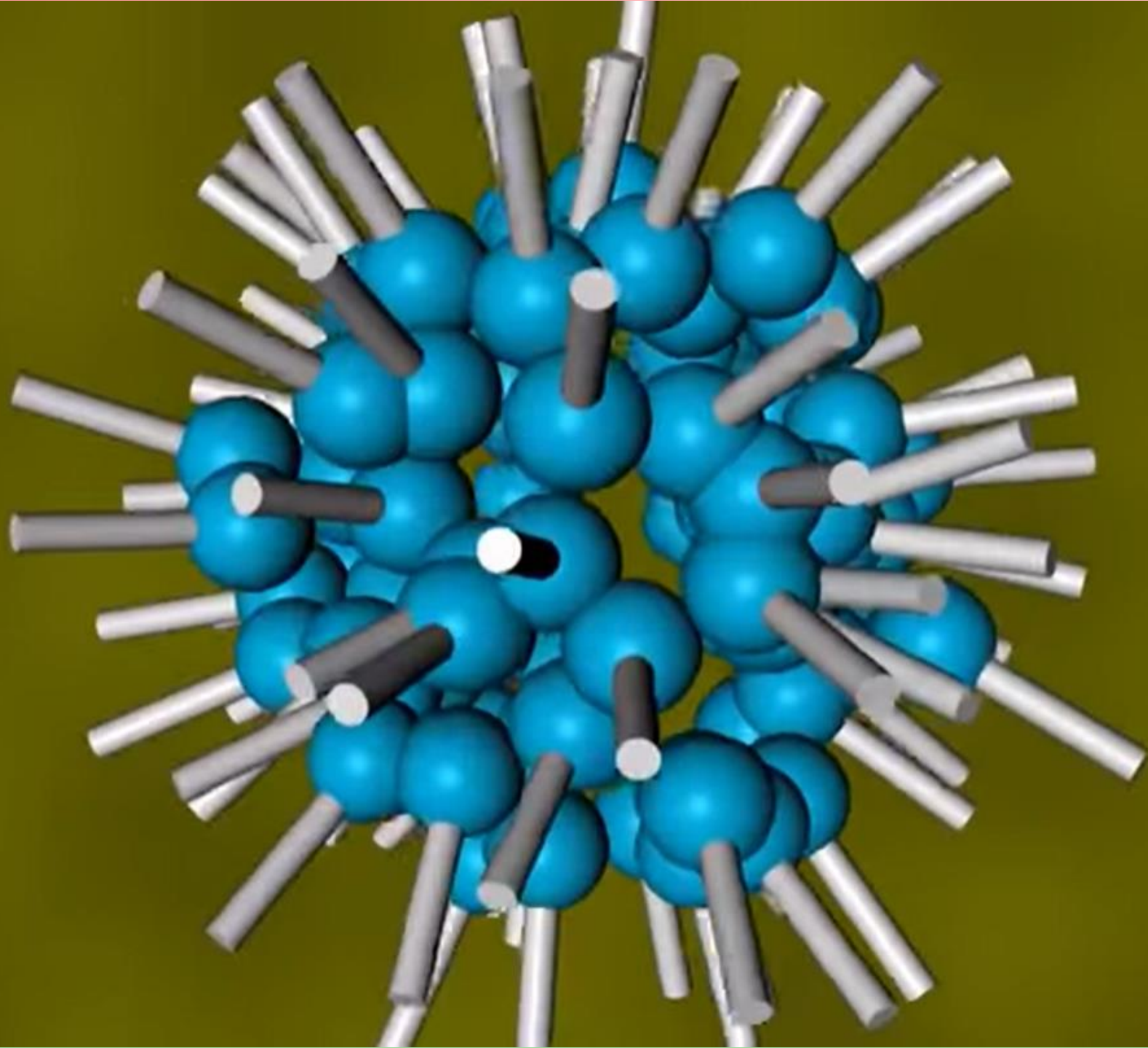


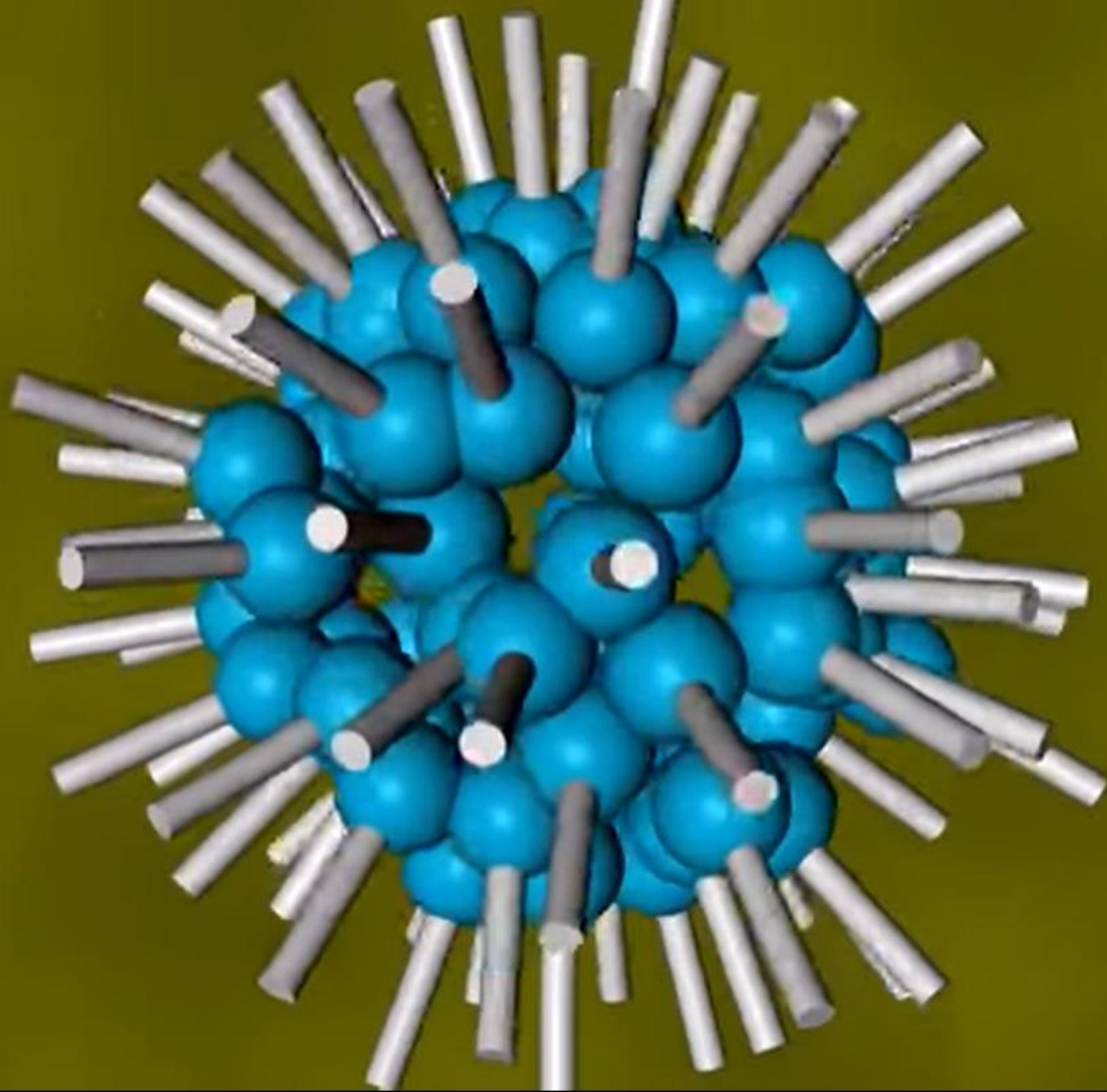


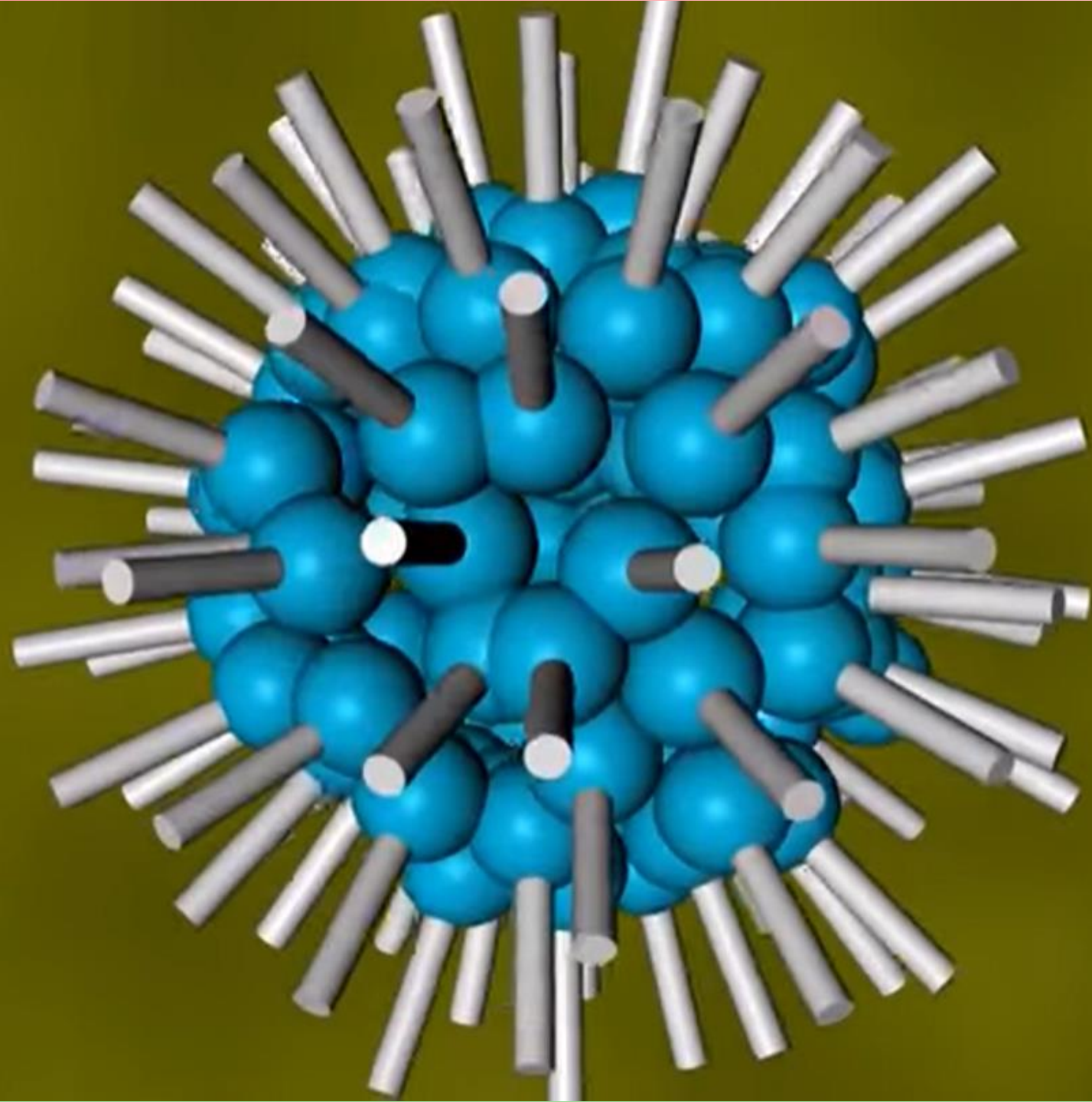


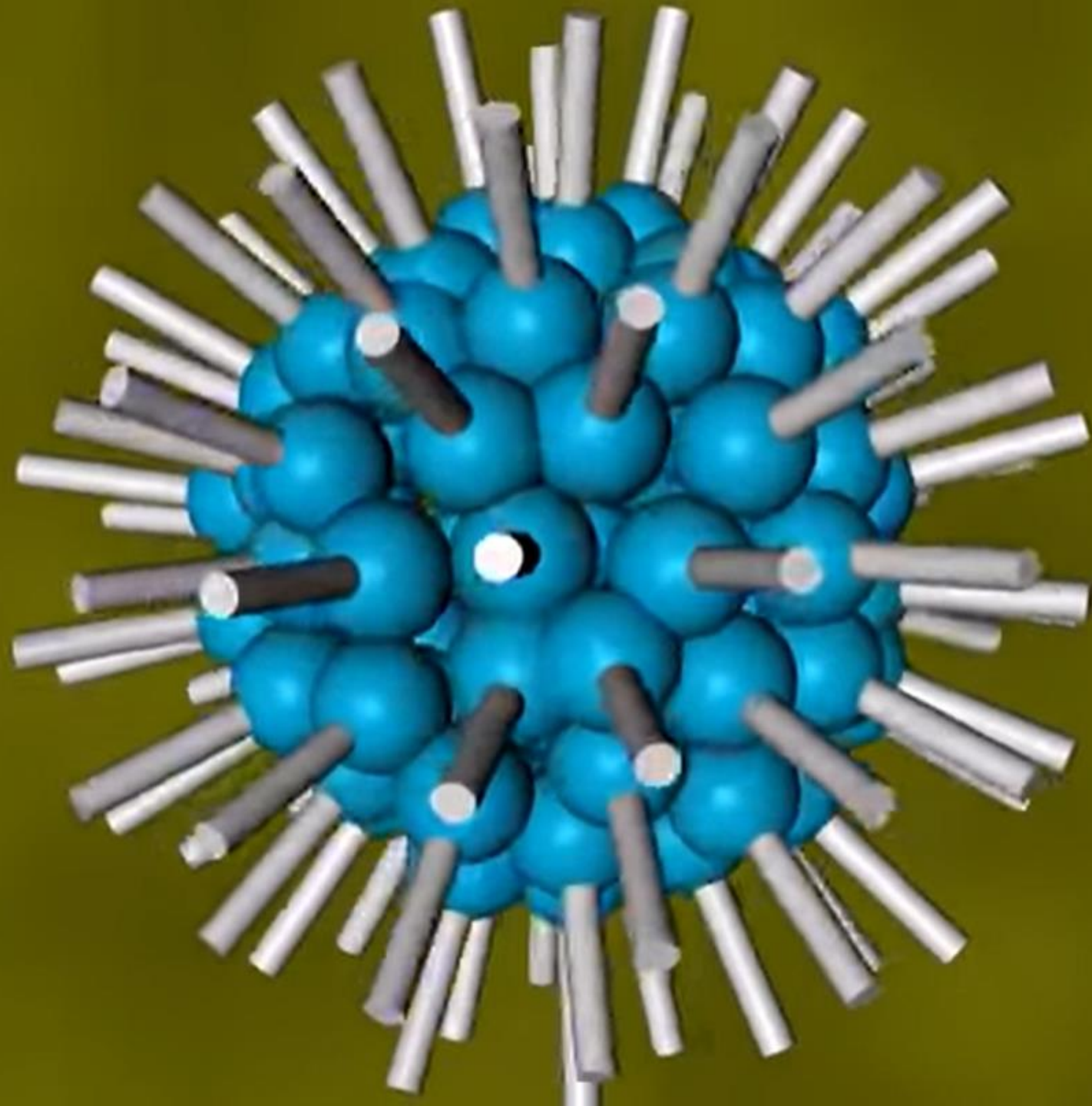


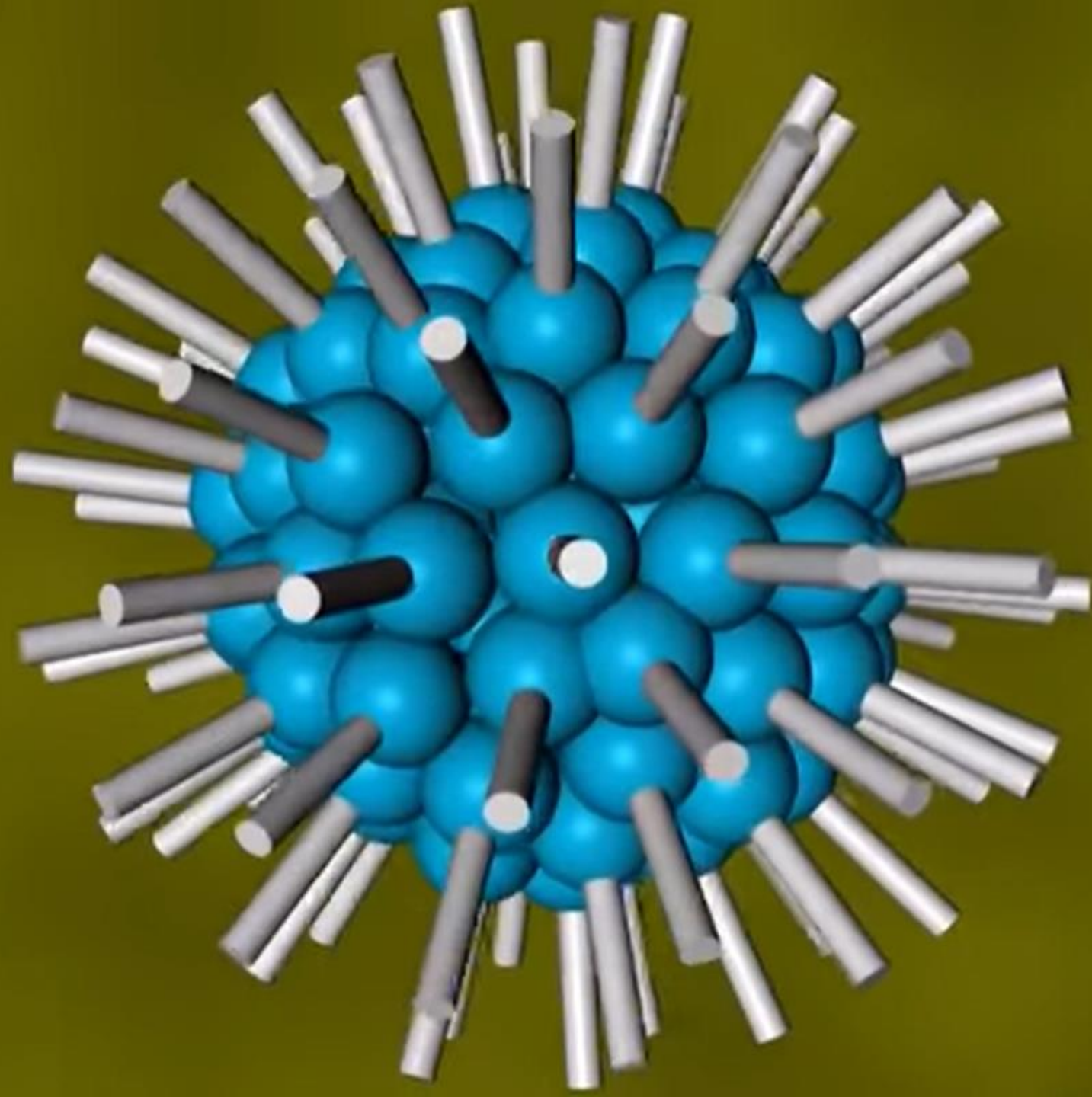


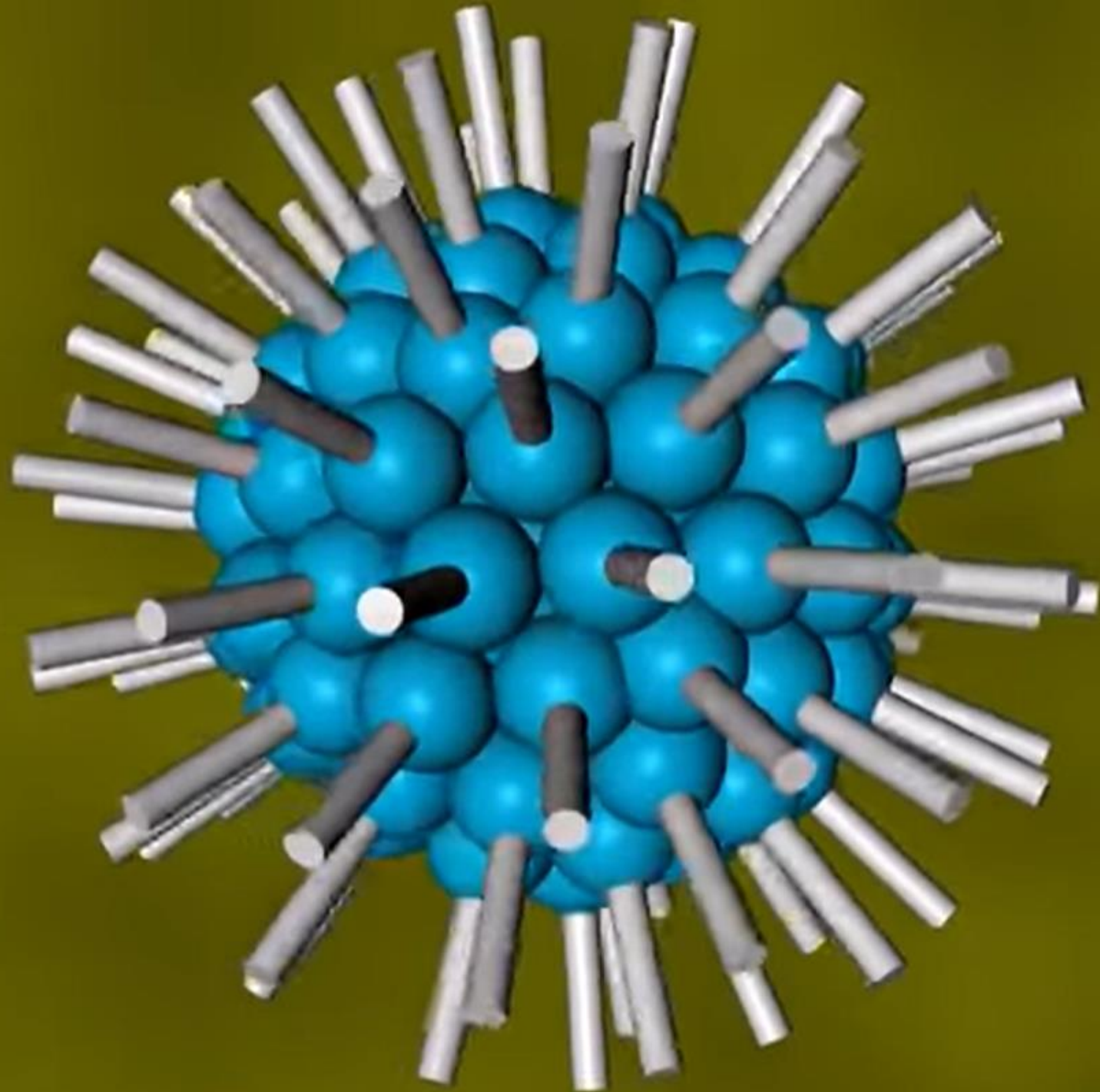


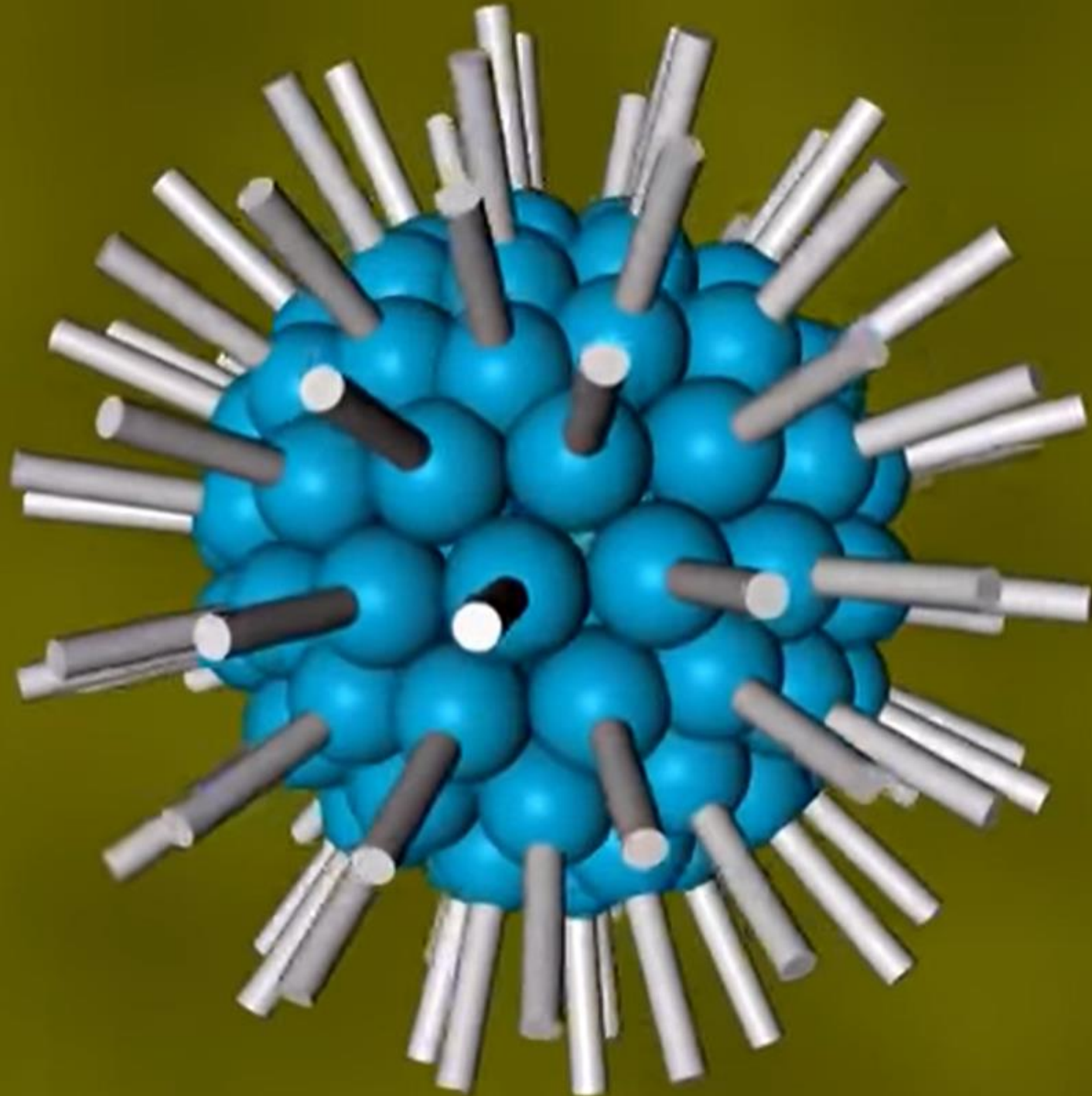


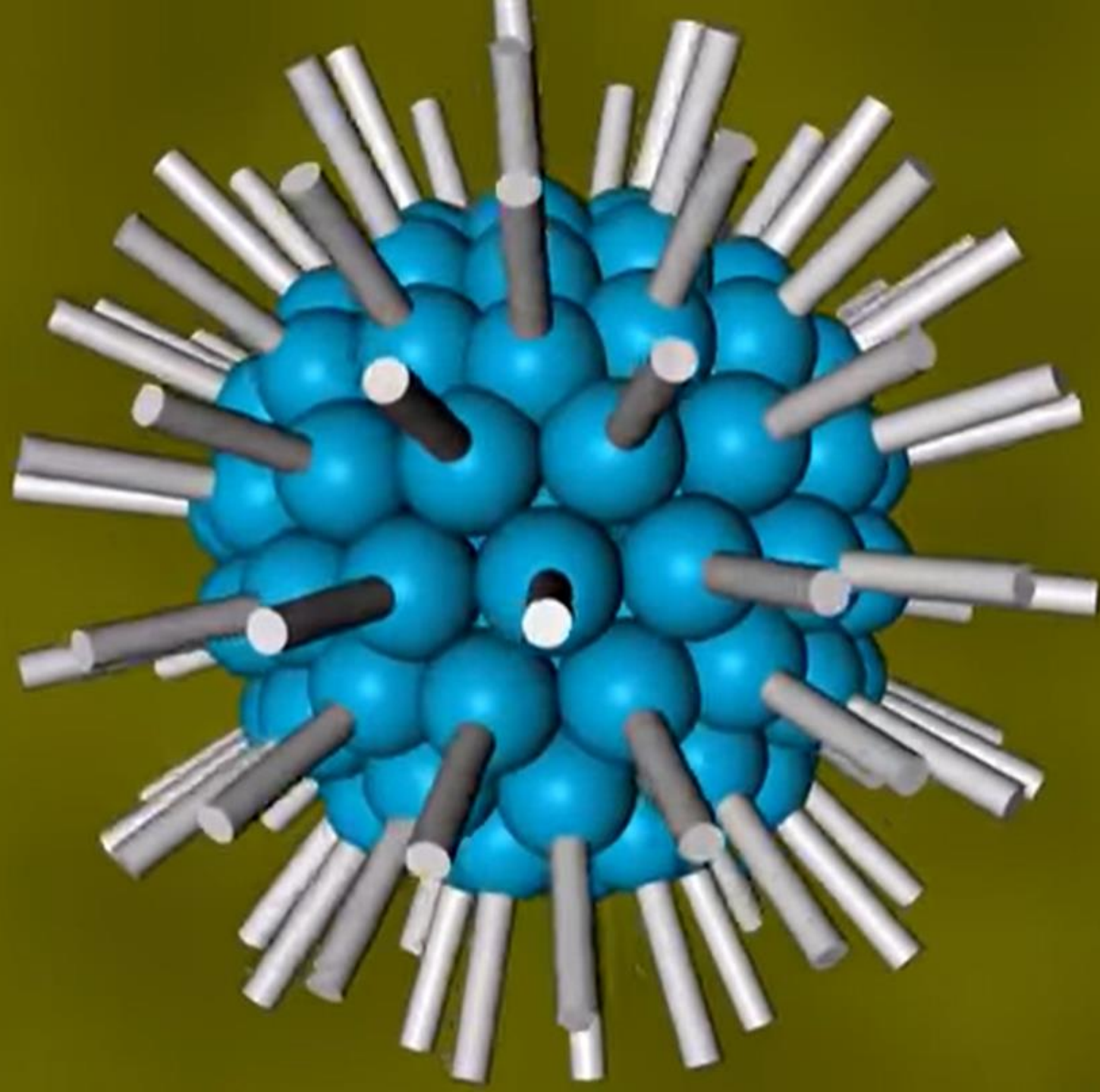


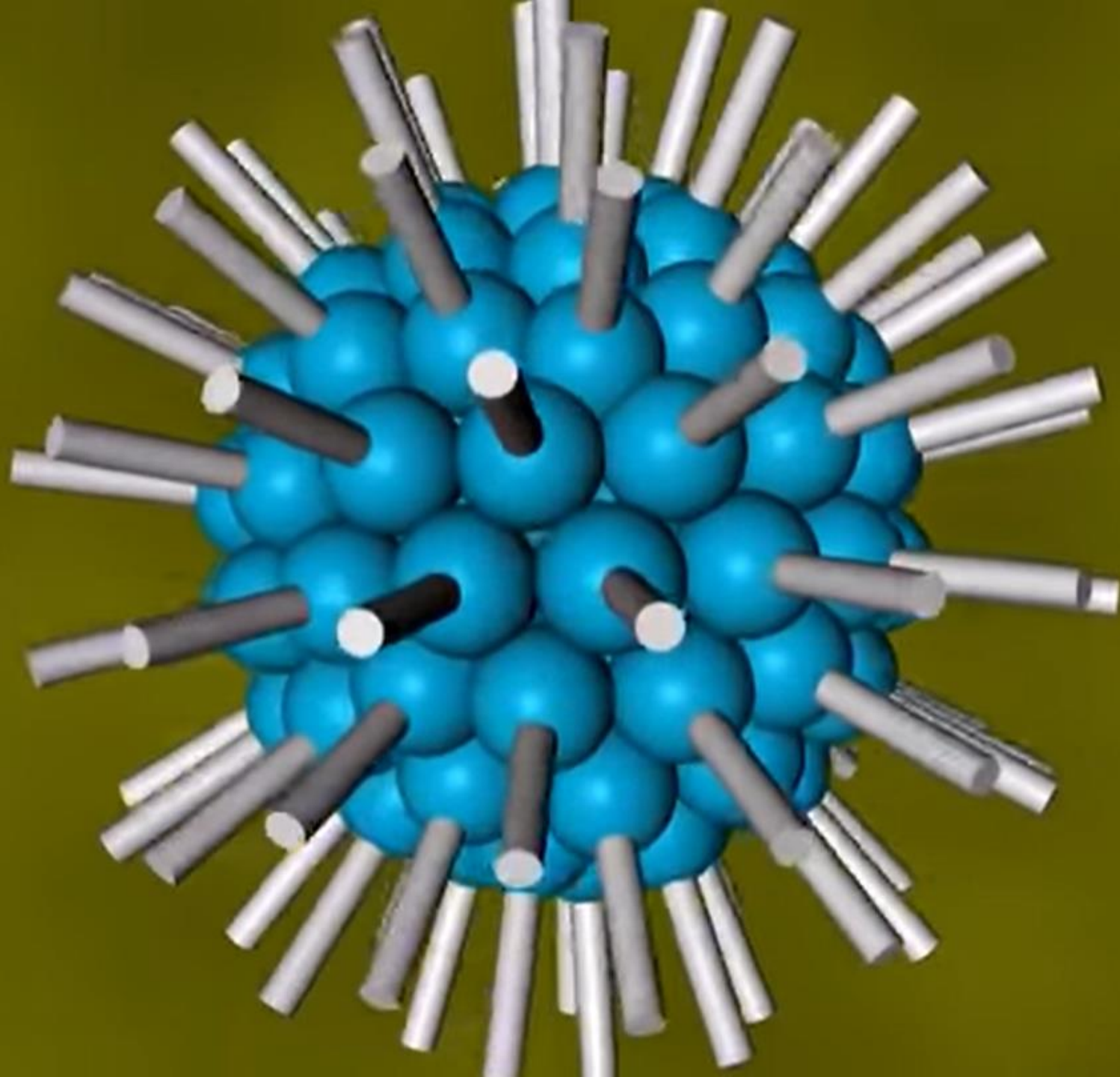


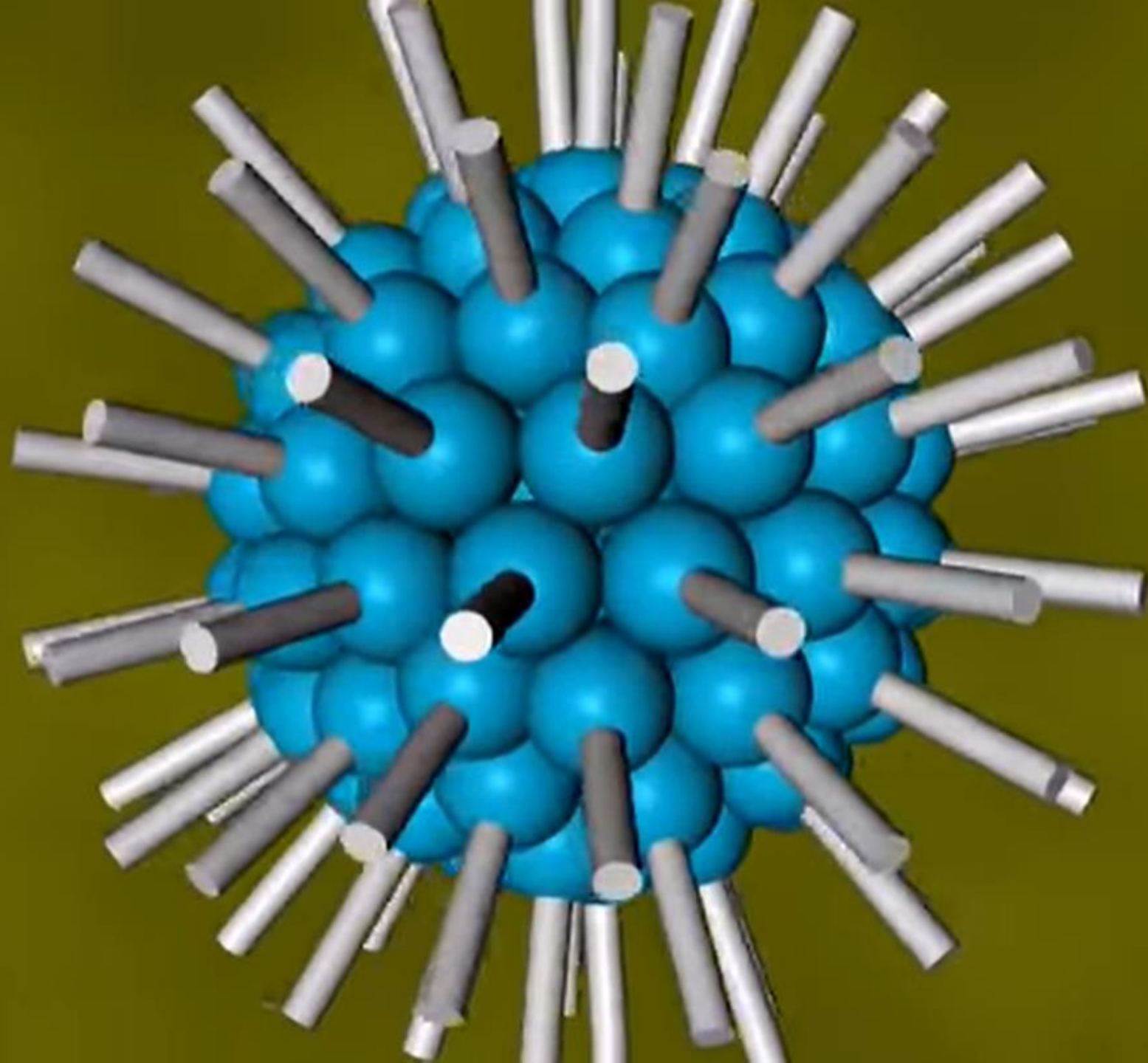


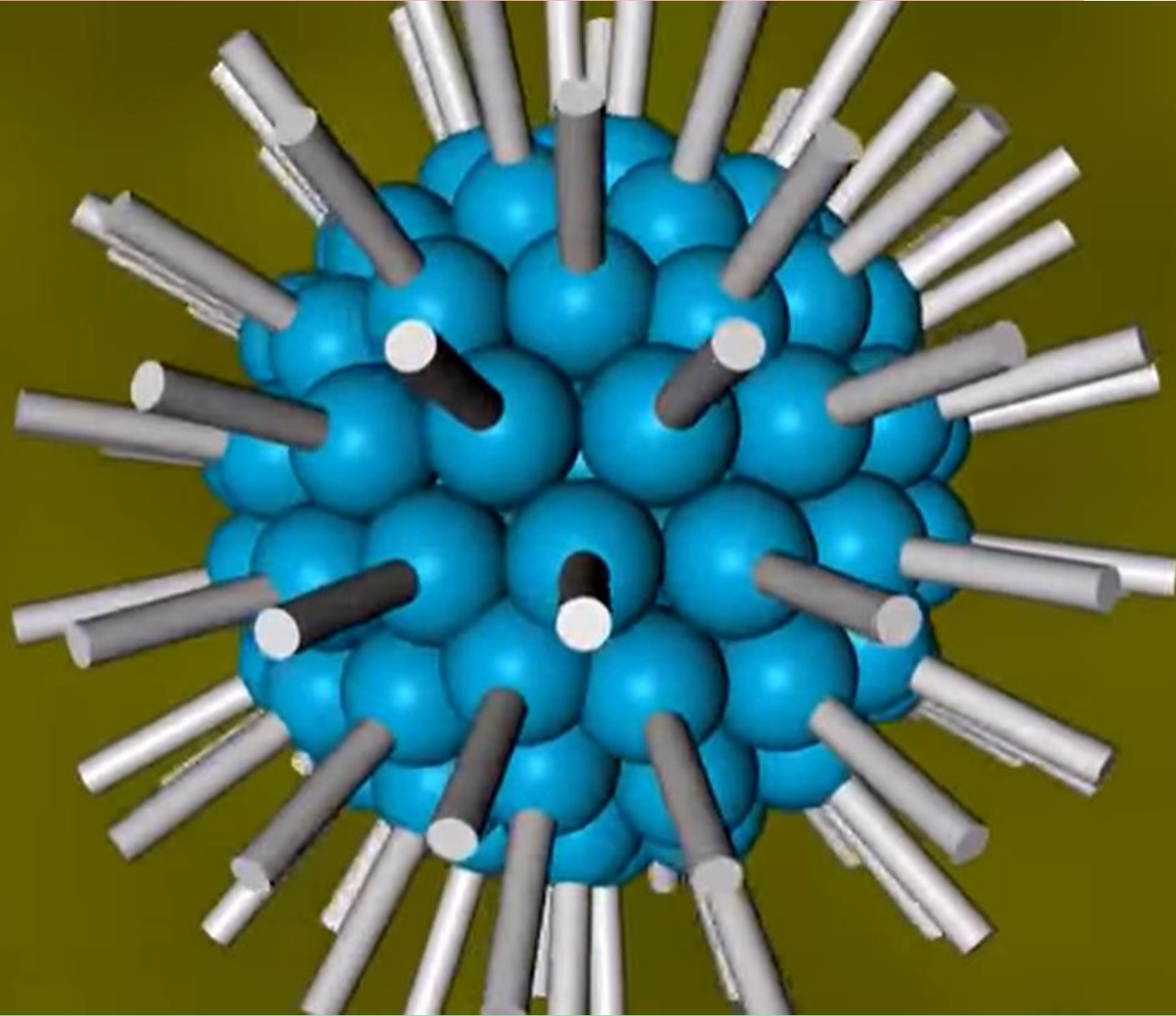


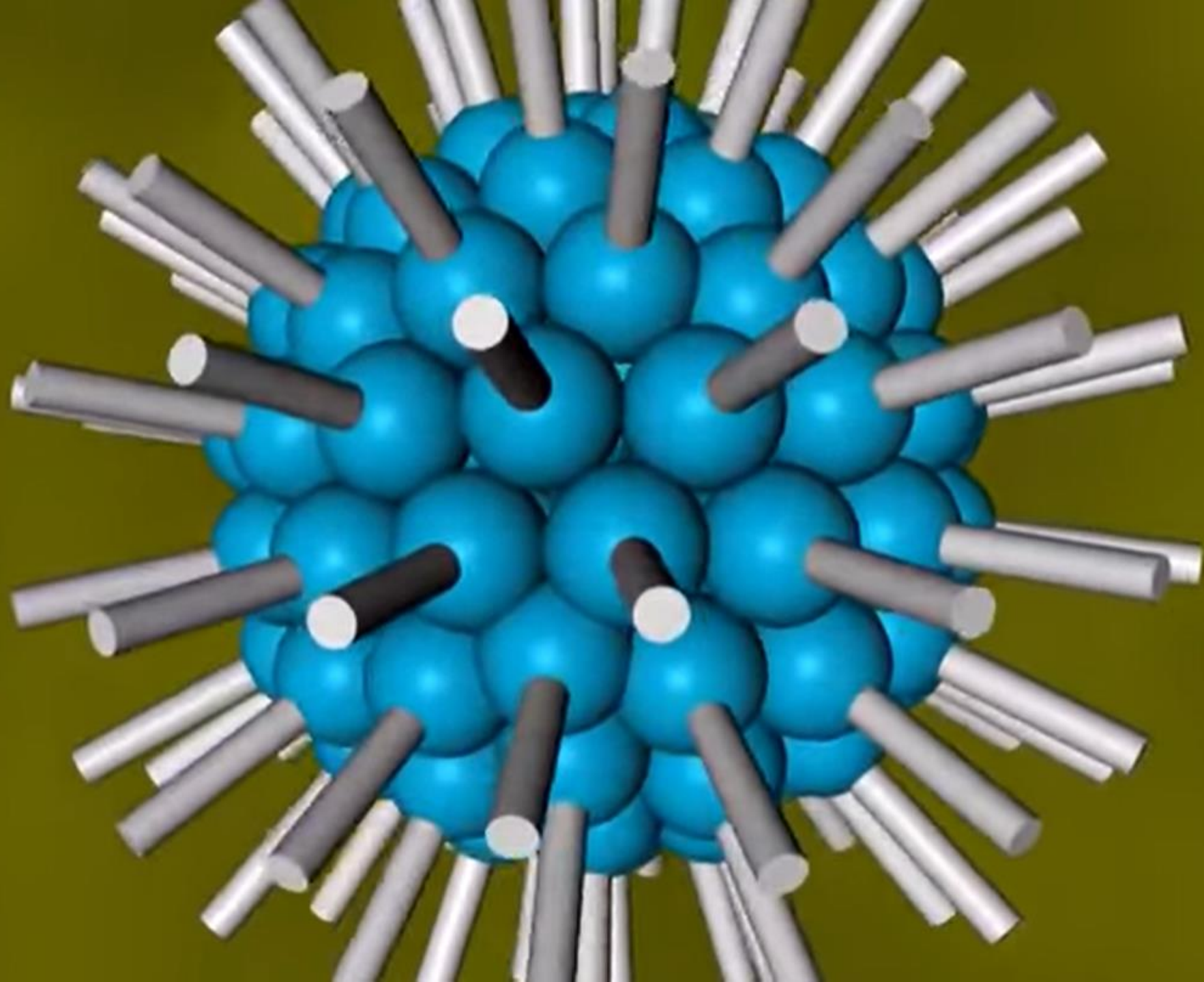


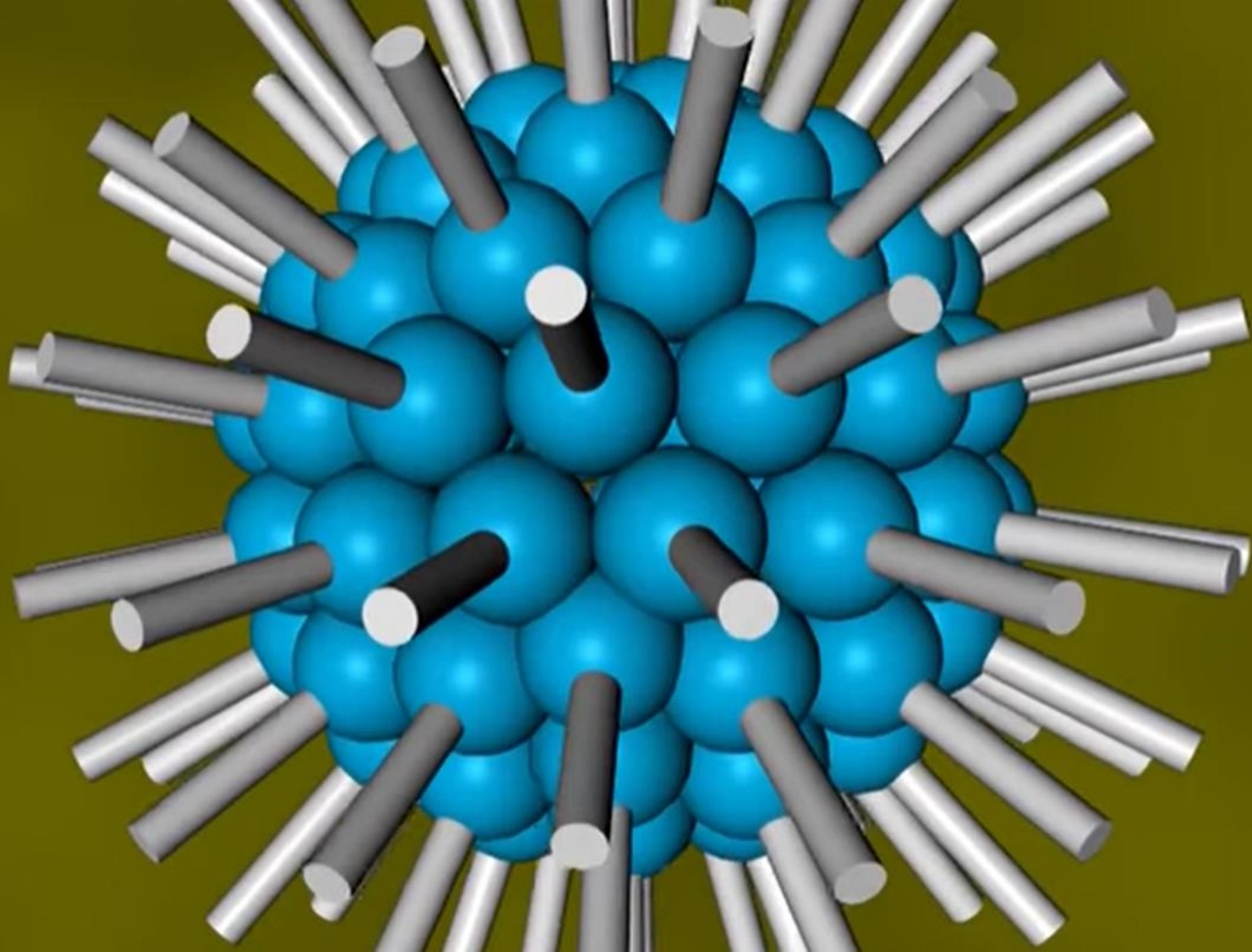


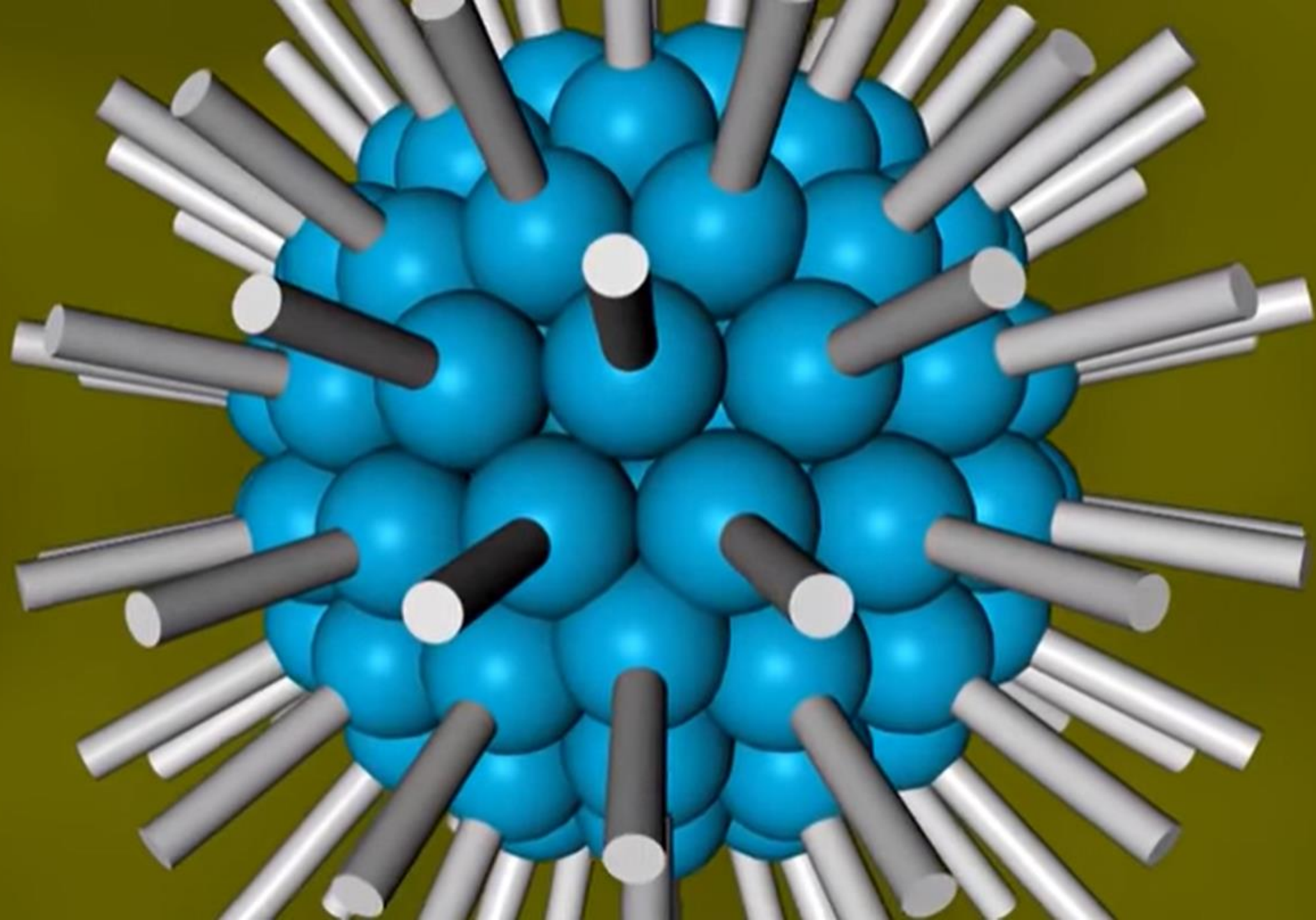


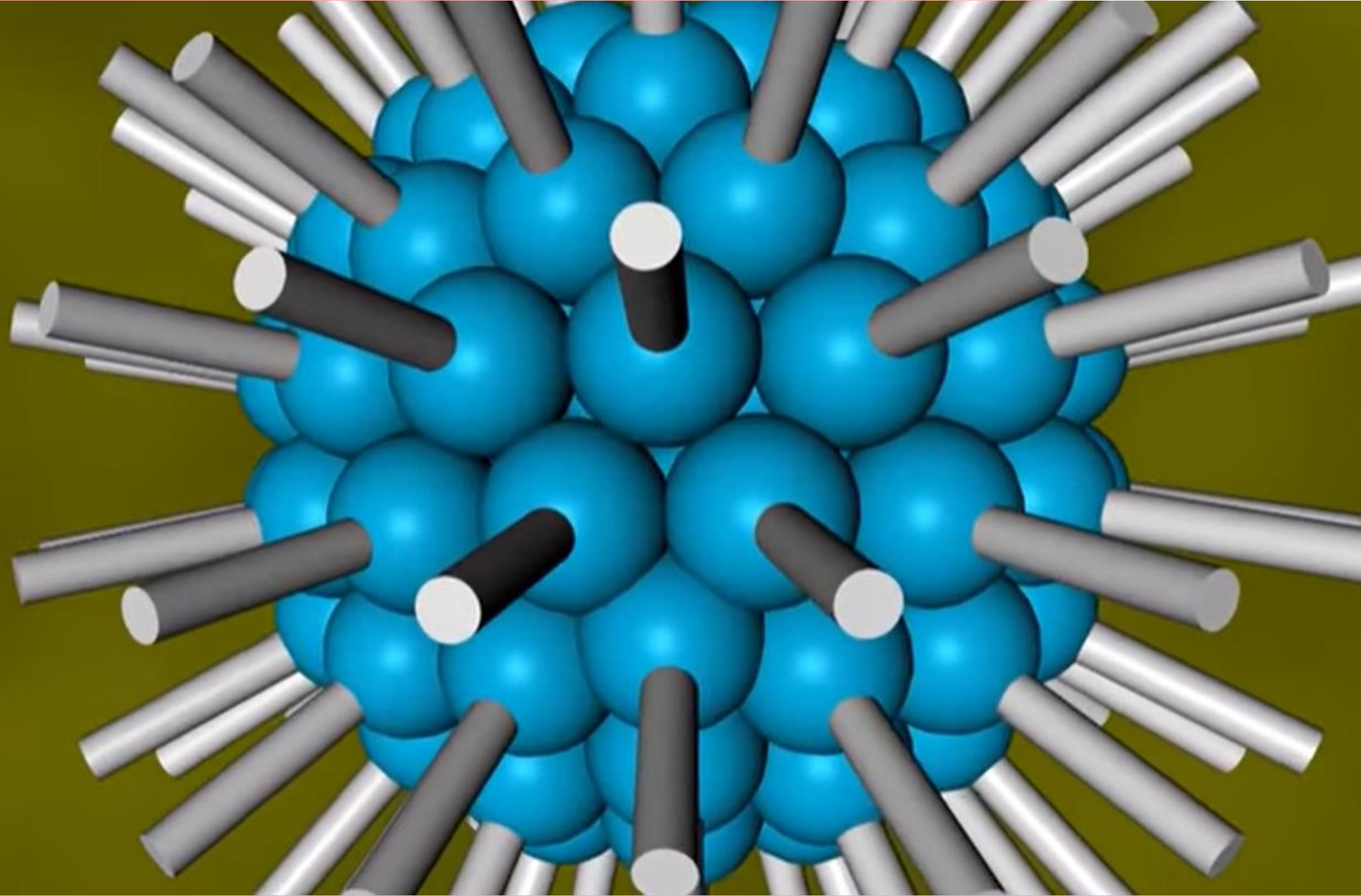


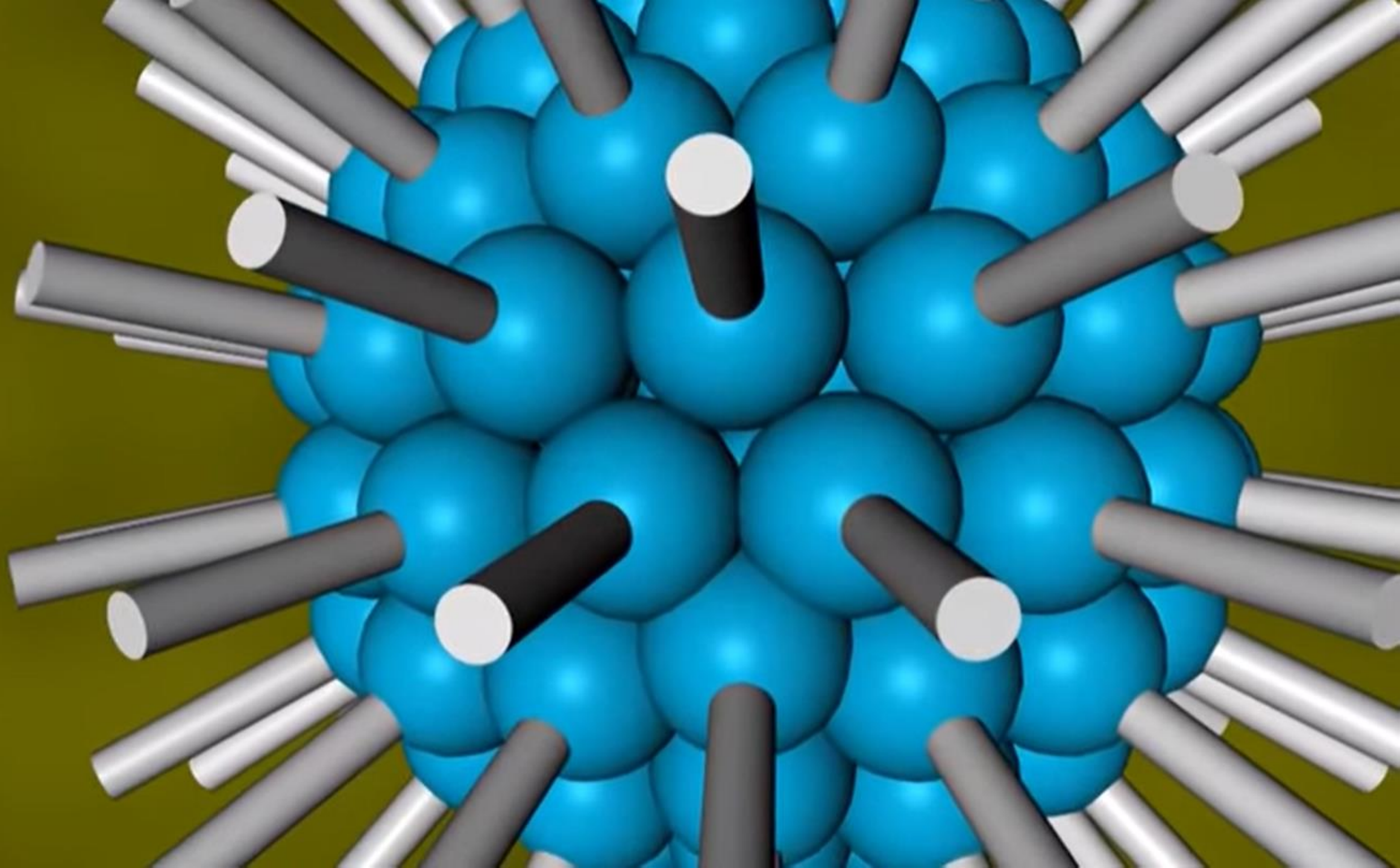


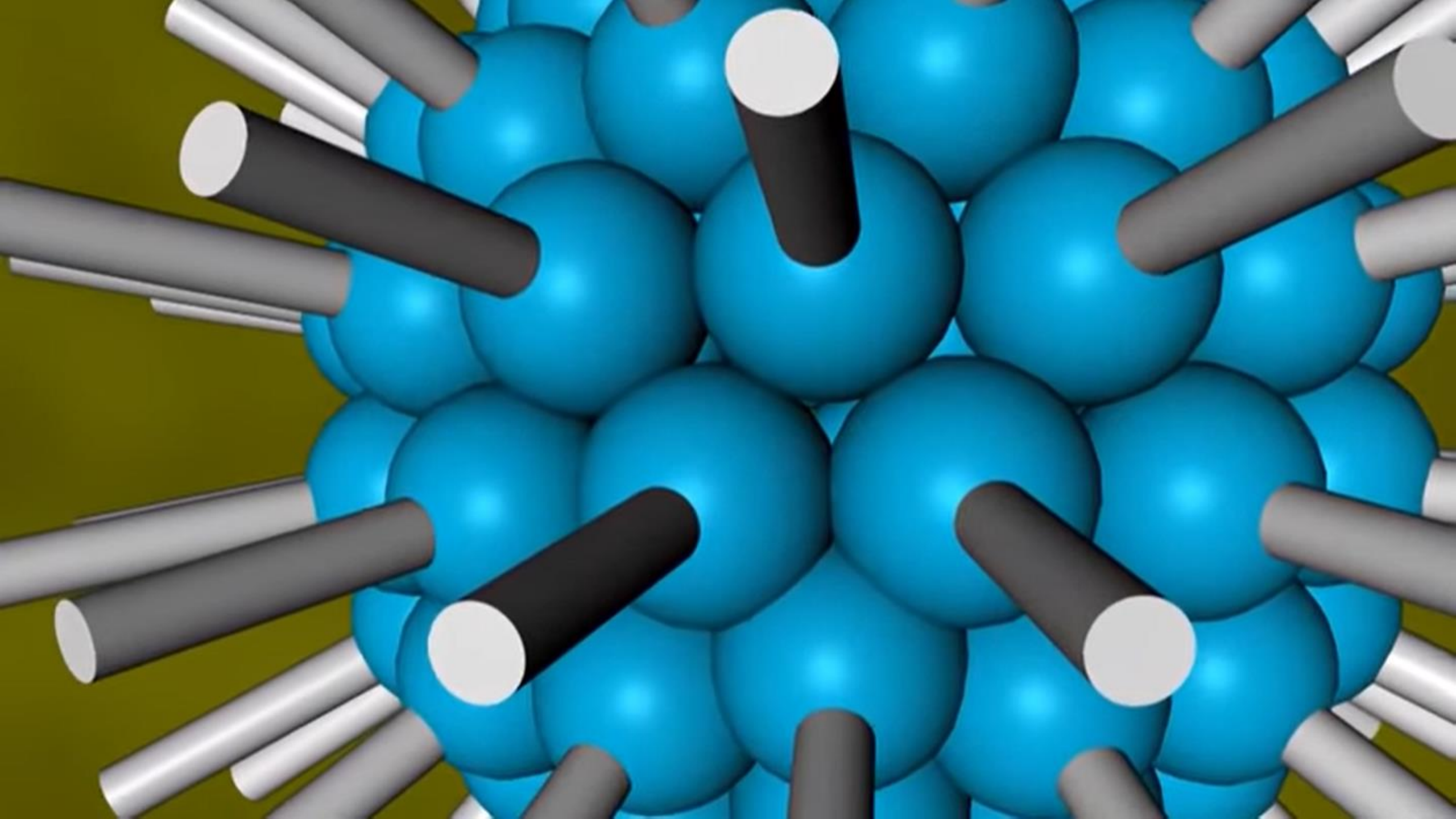


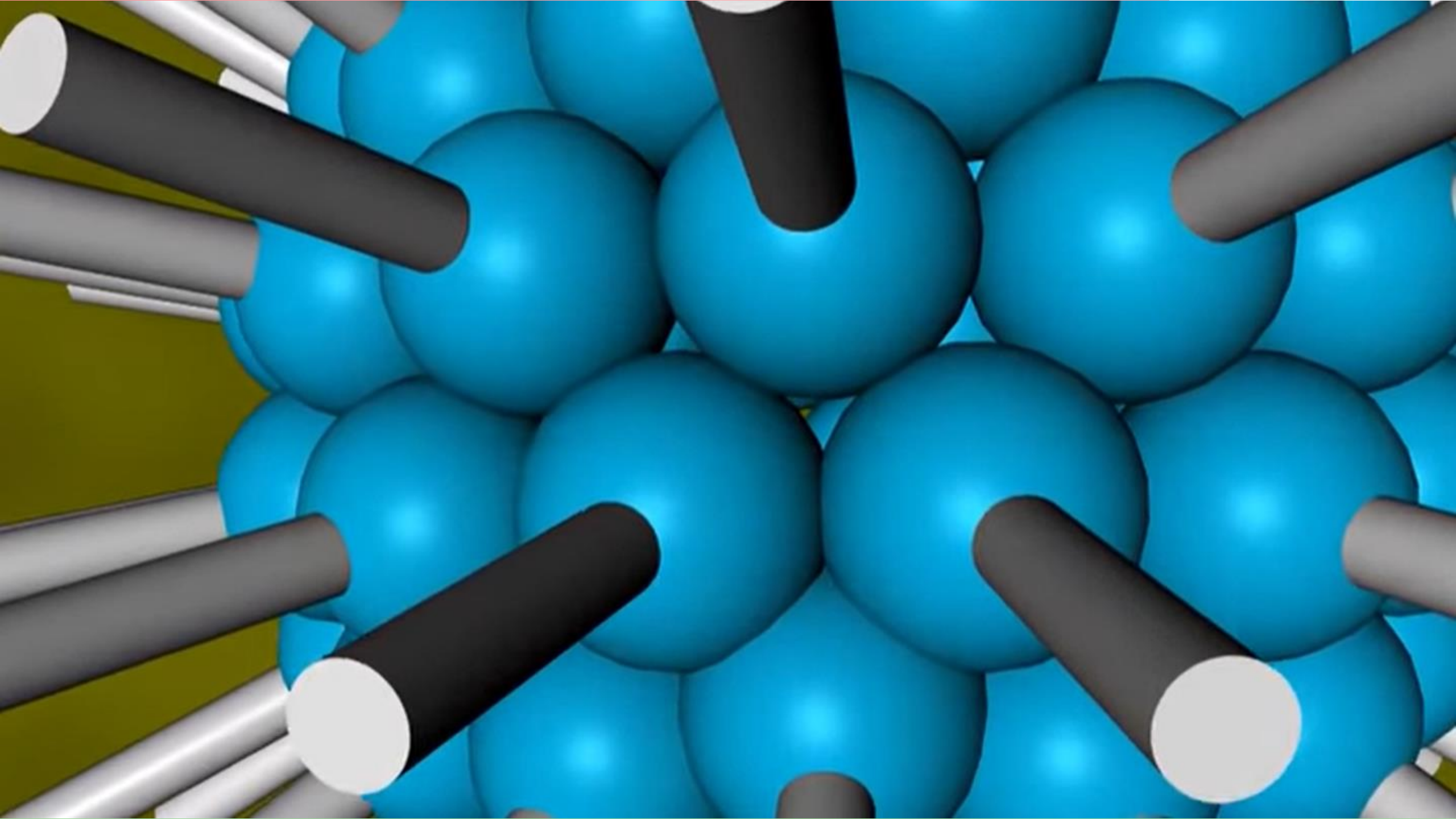


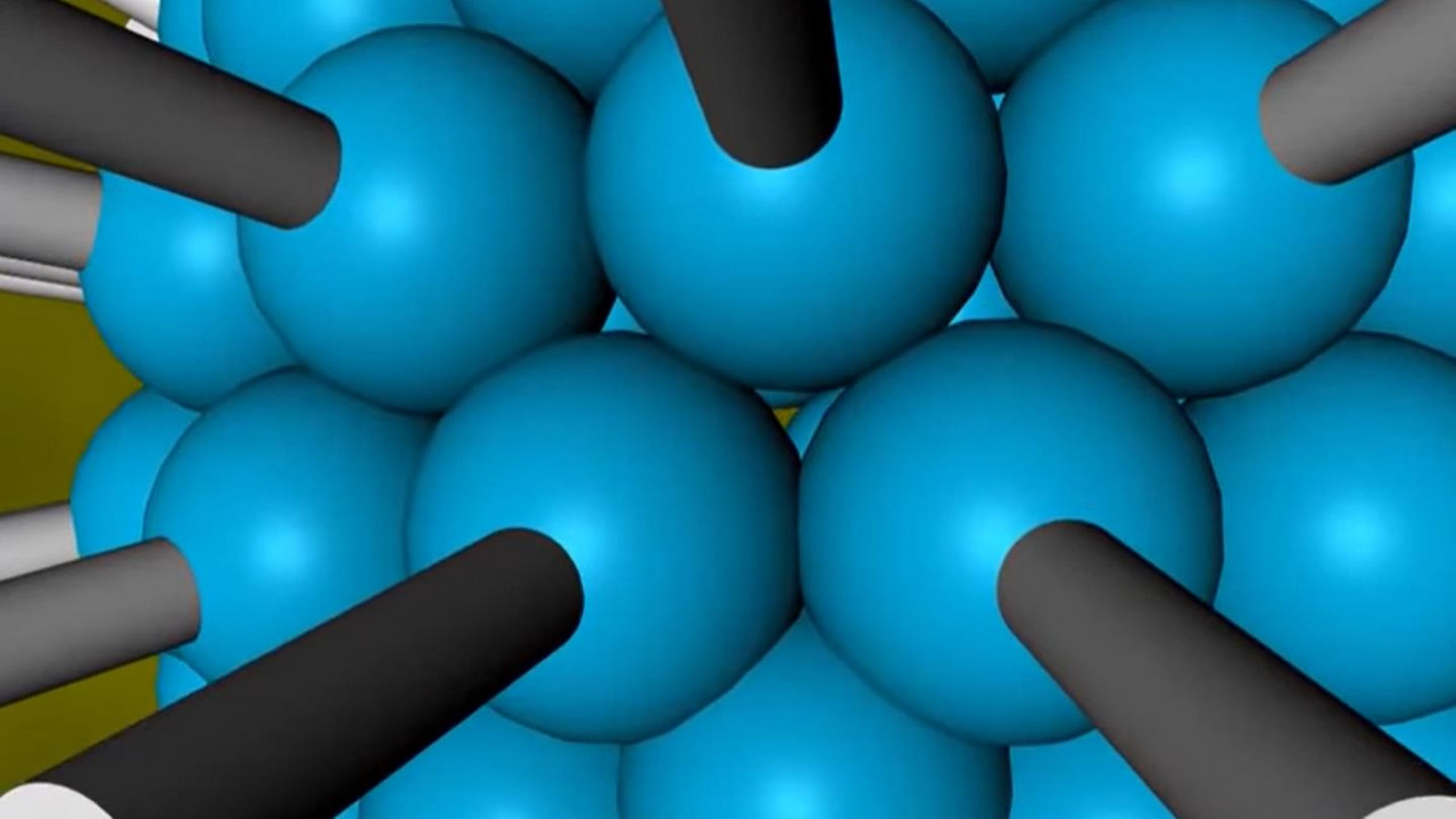


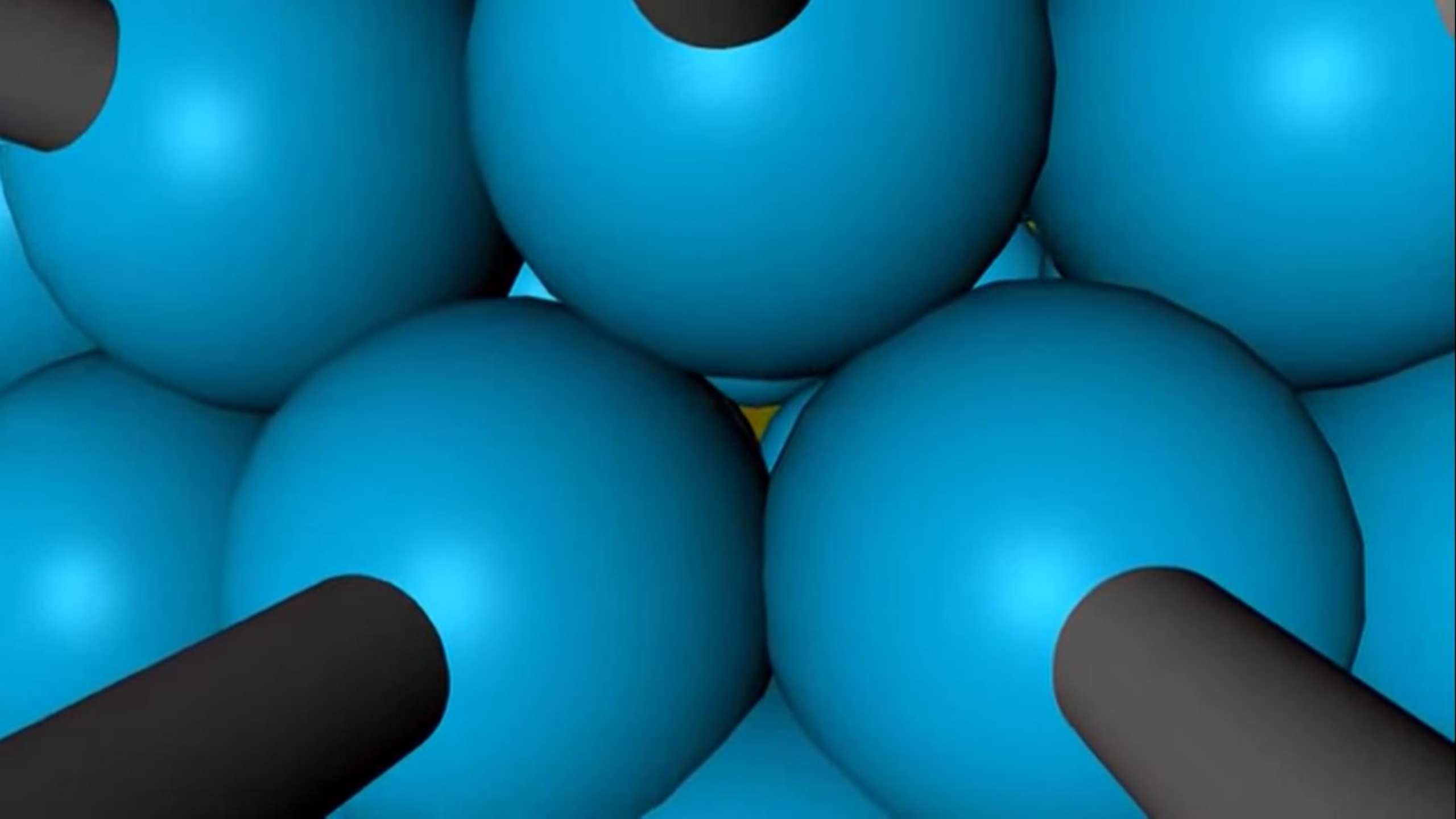


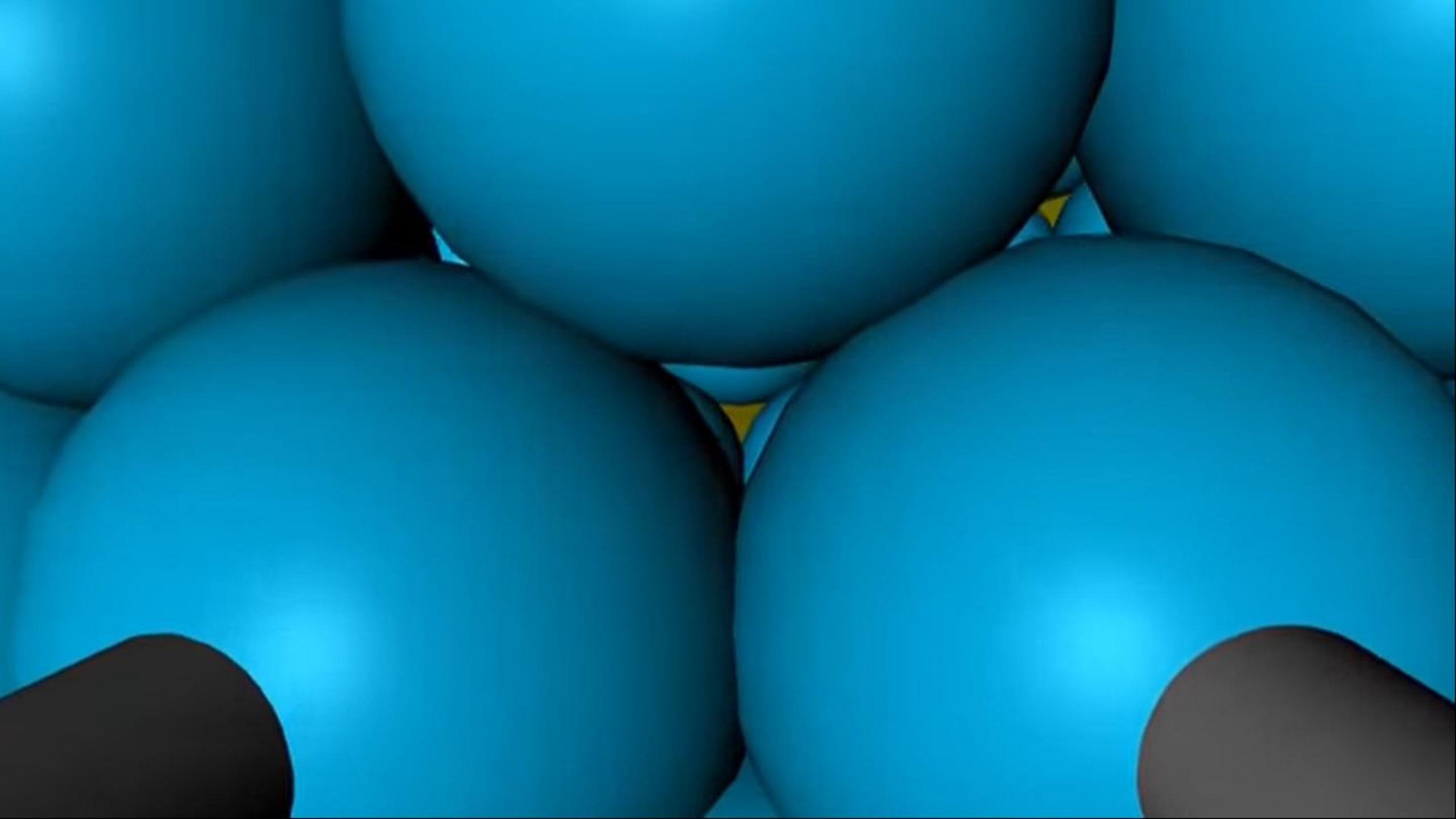


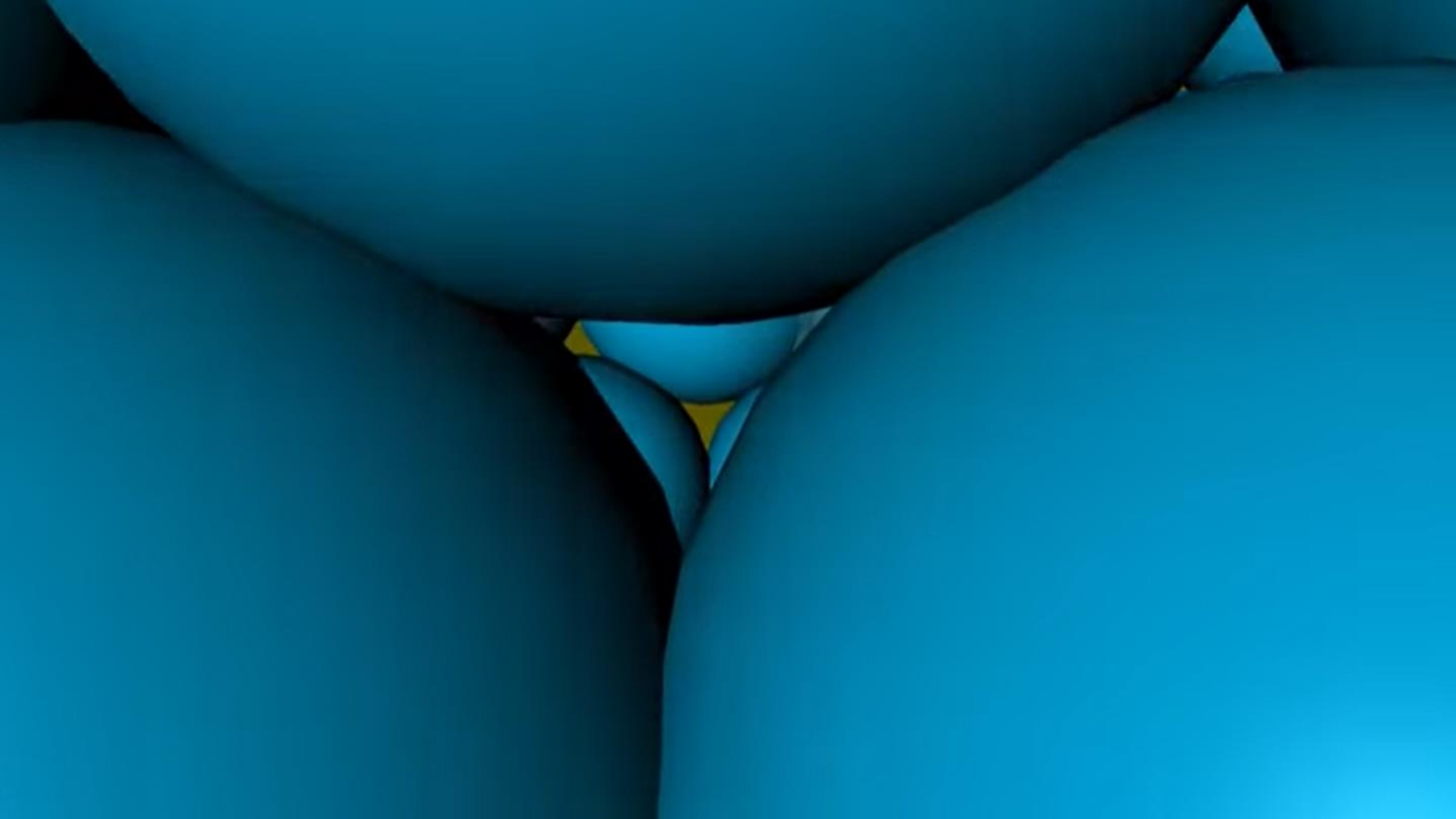


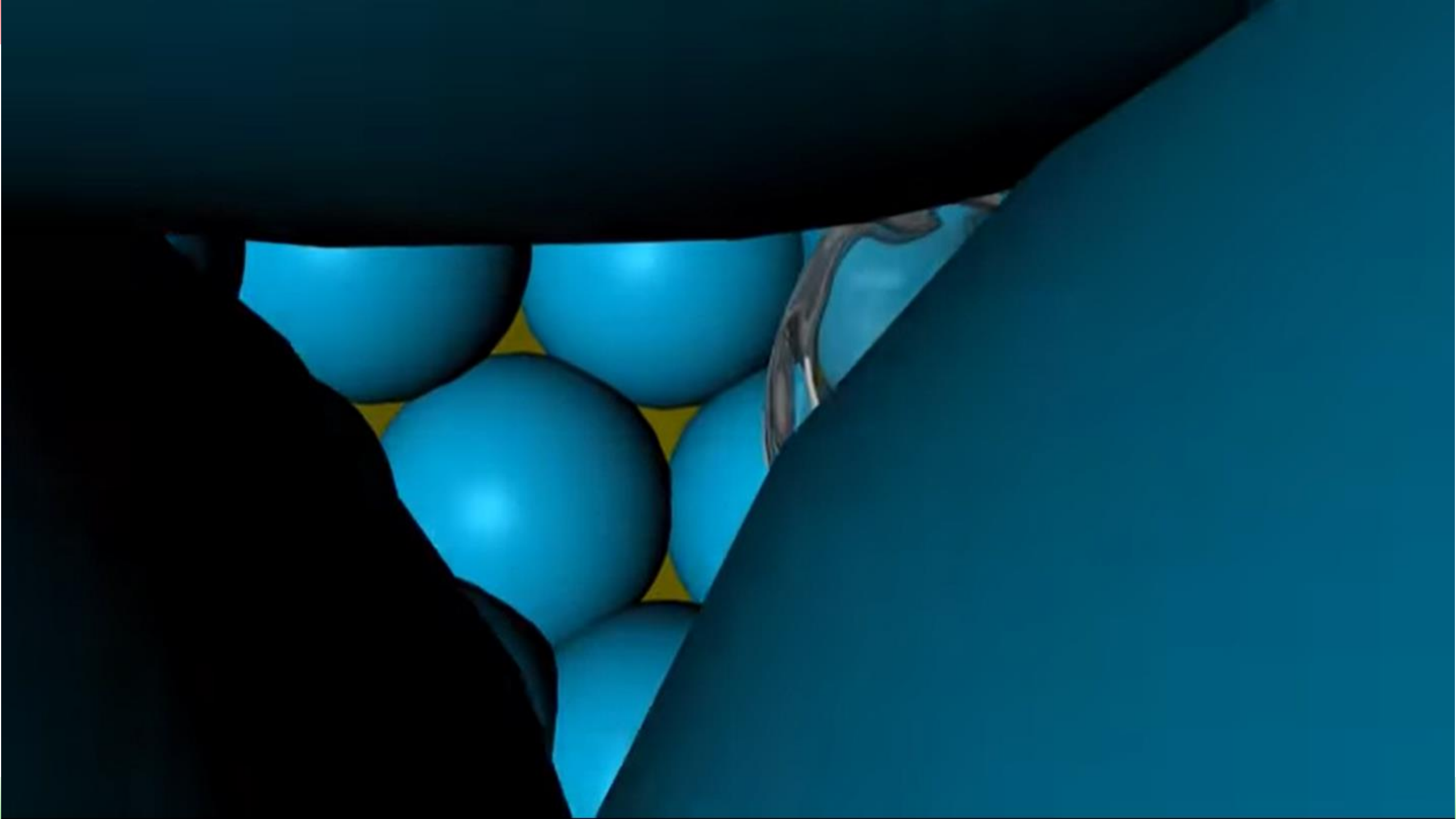


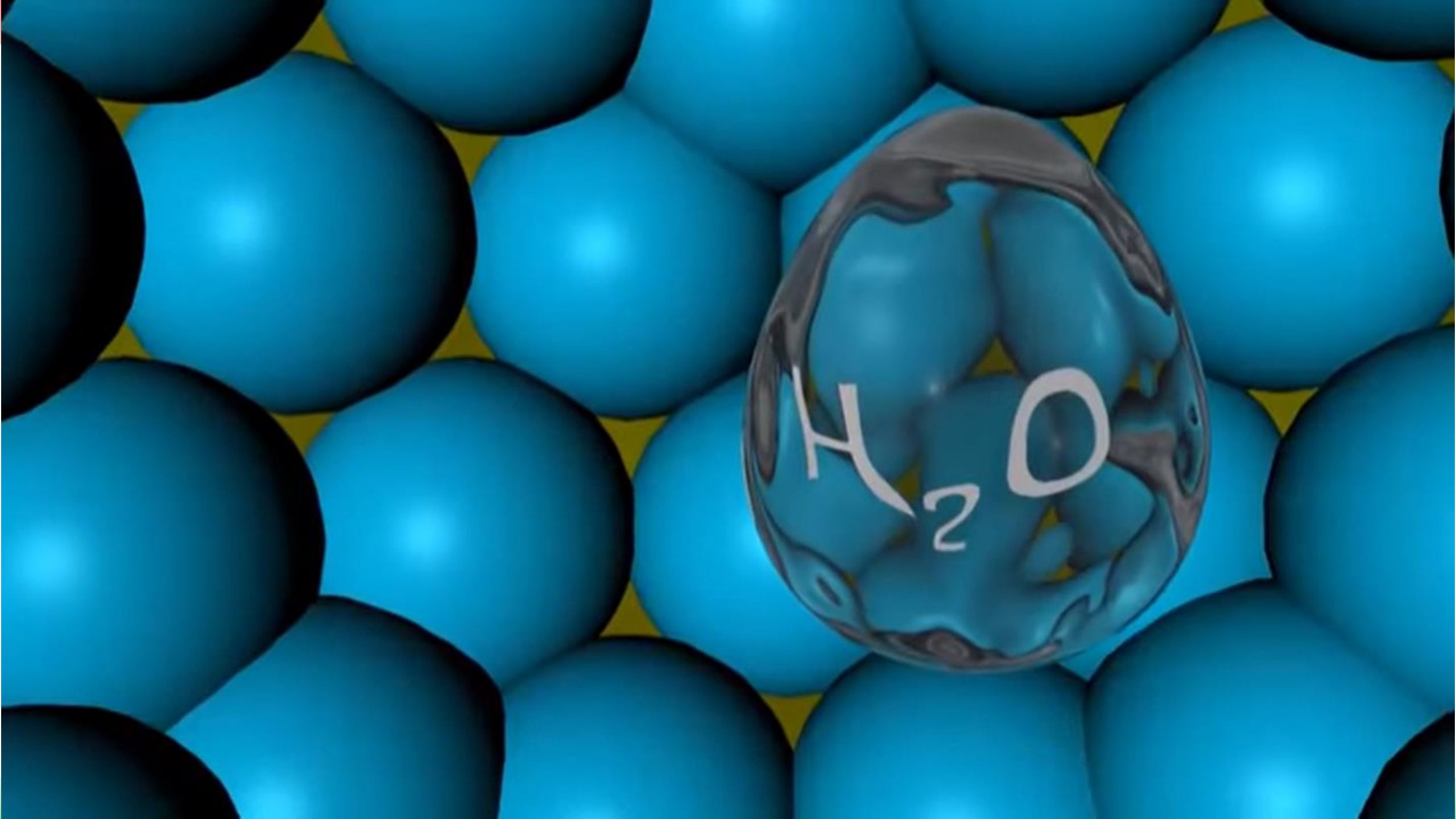


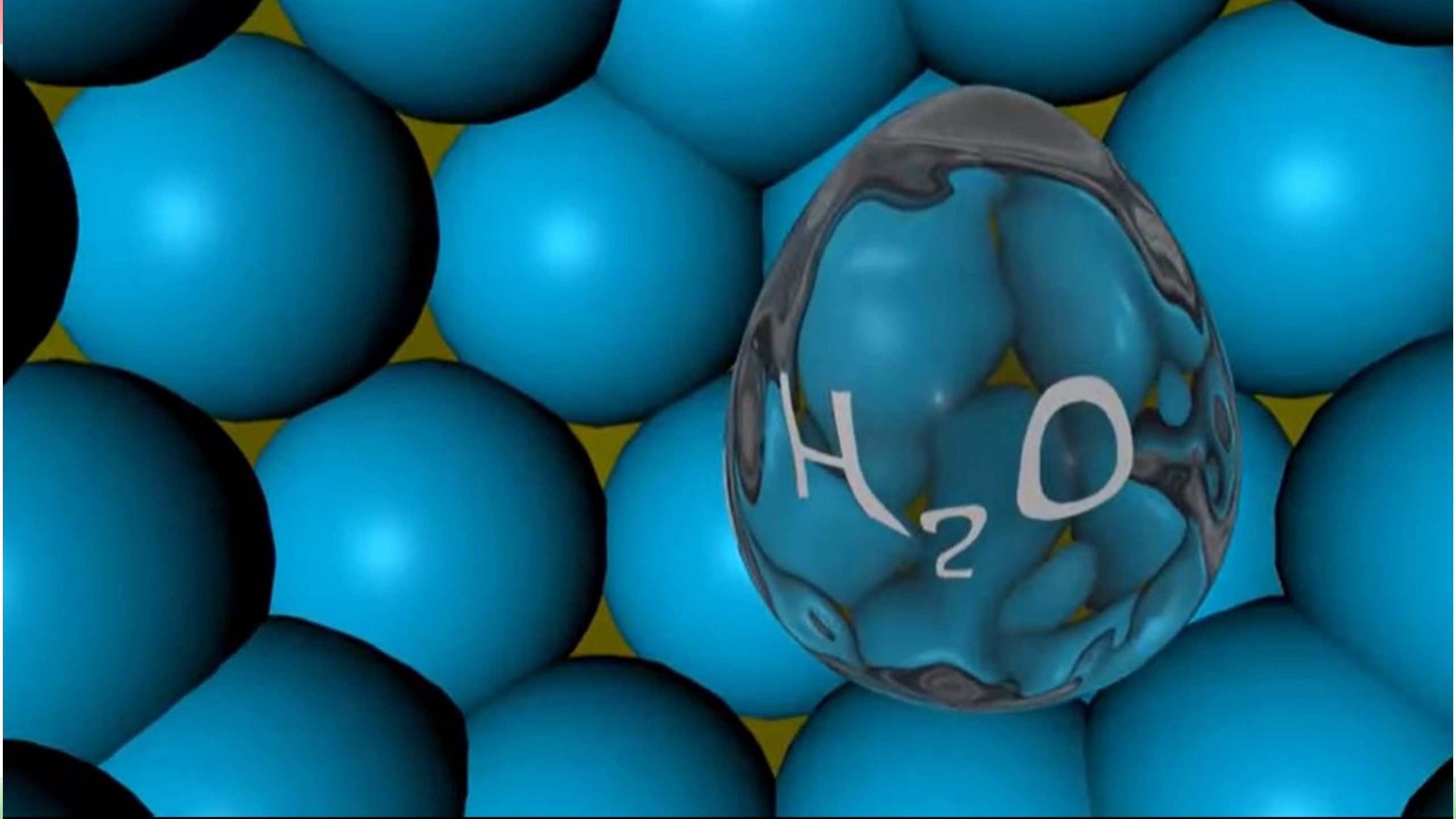


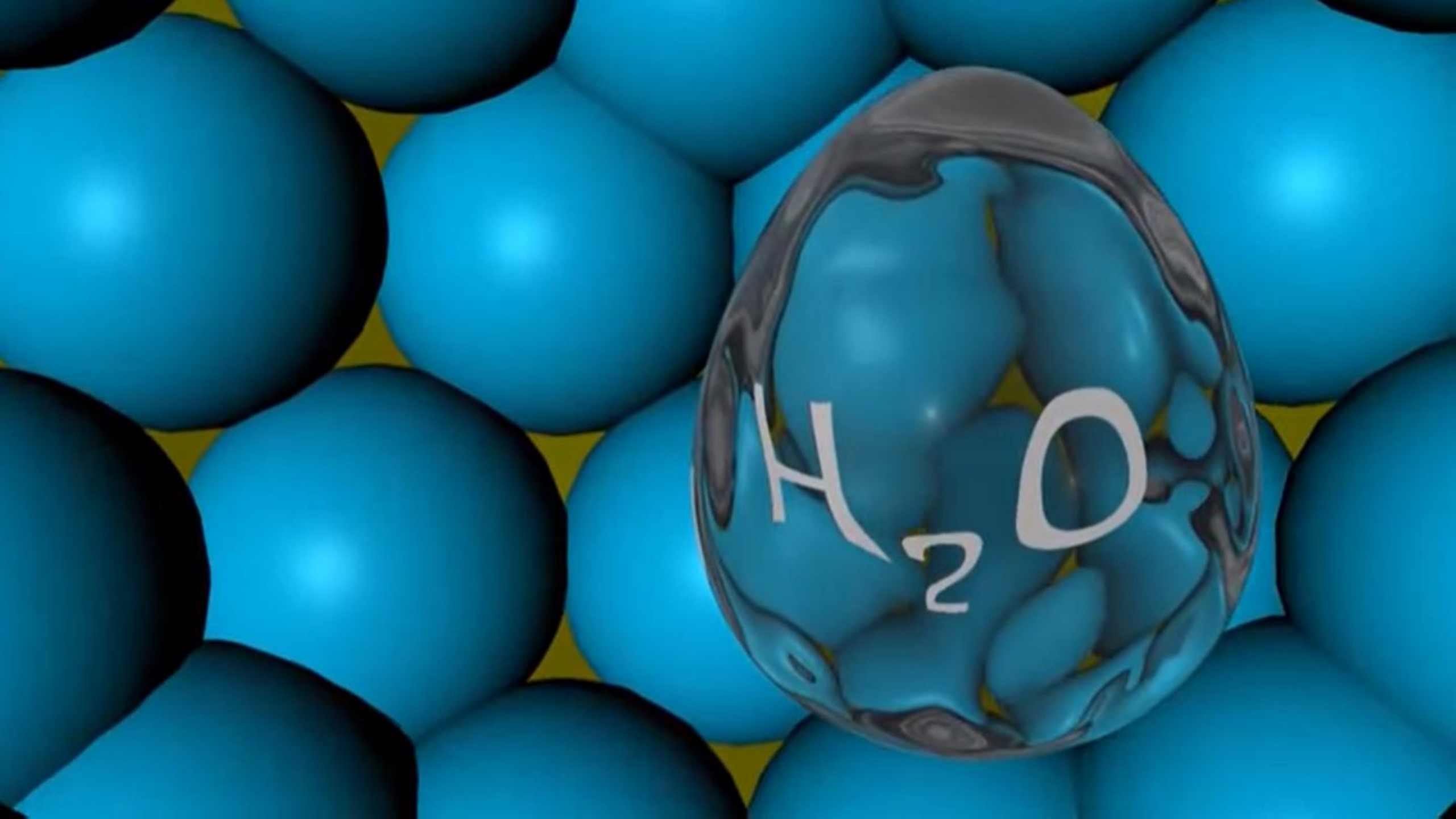


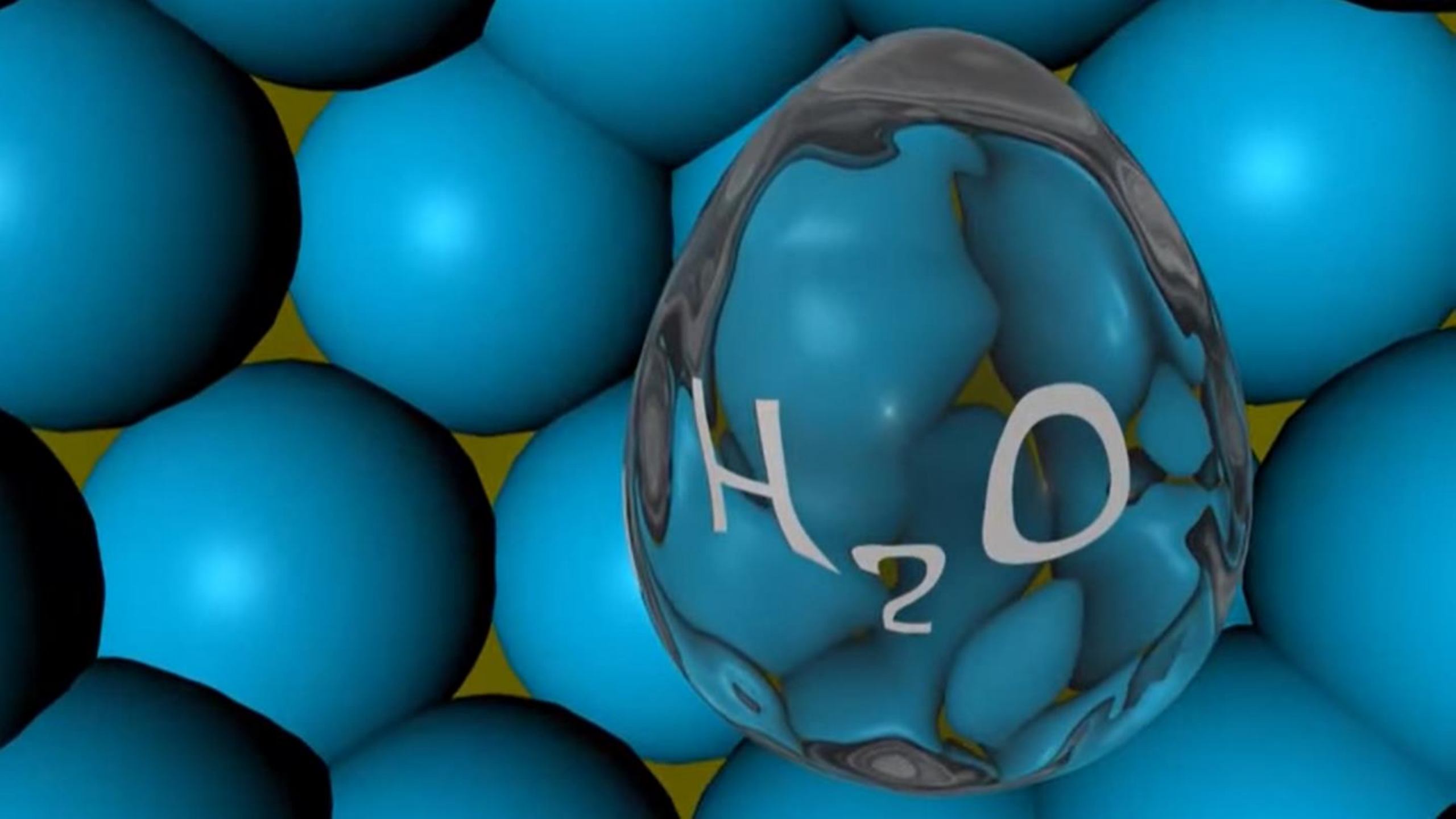










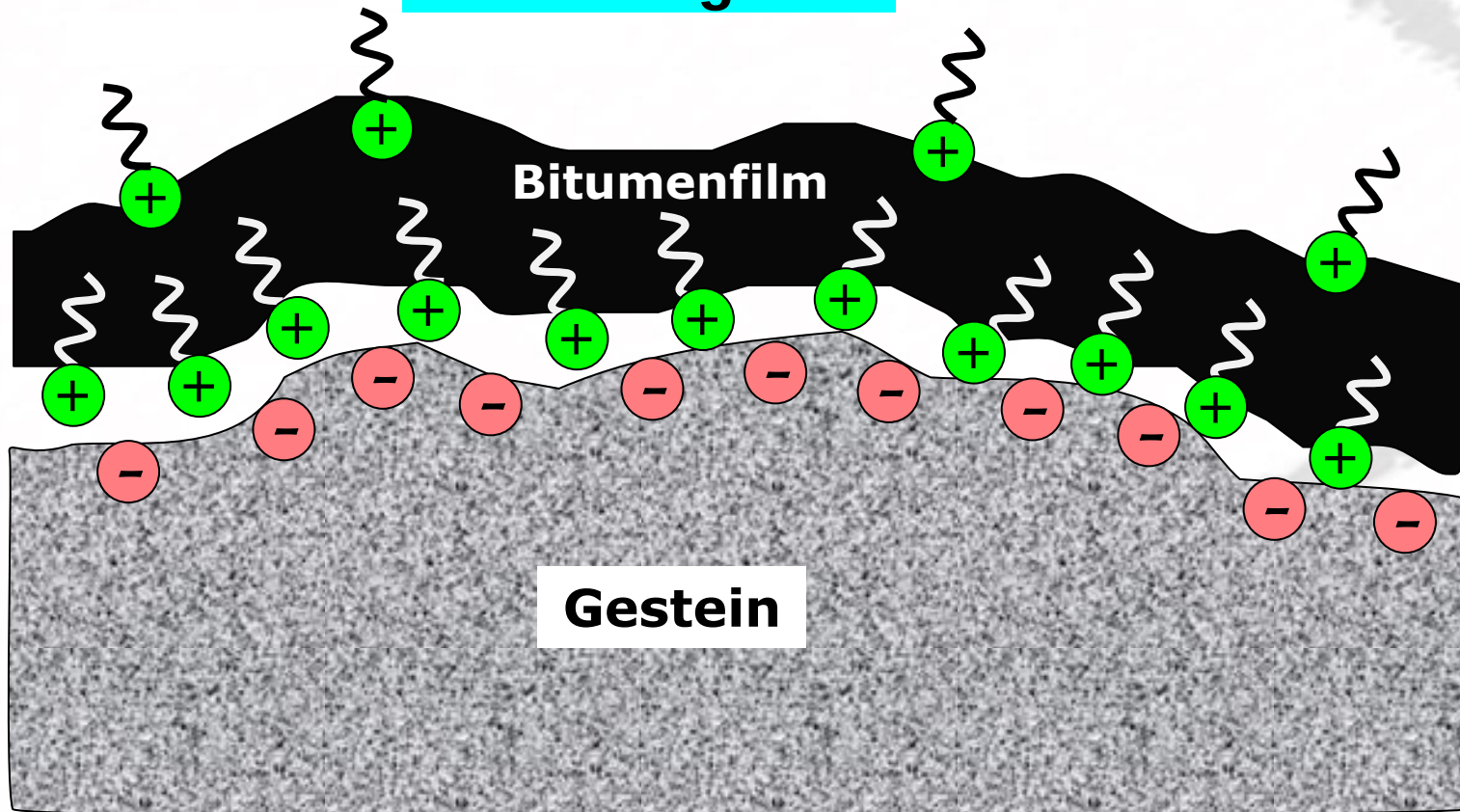


Restfeuchte

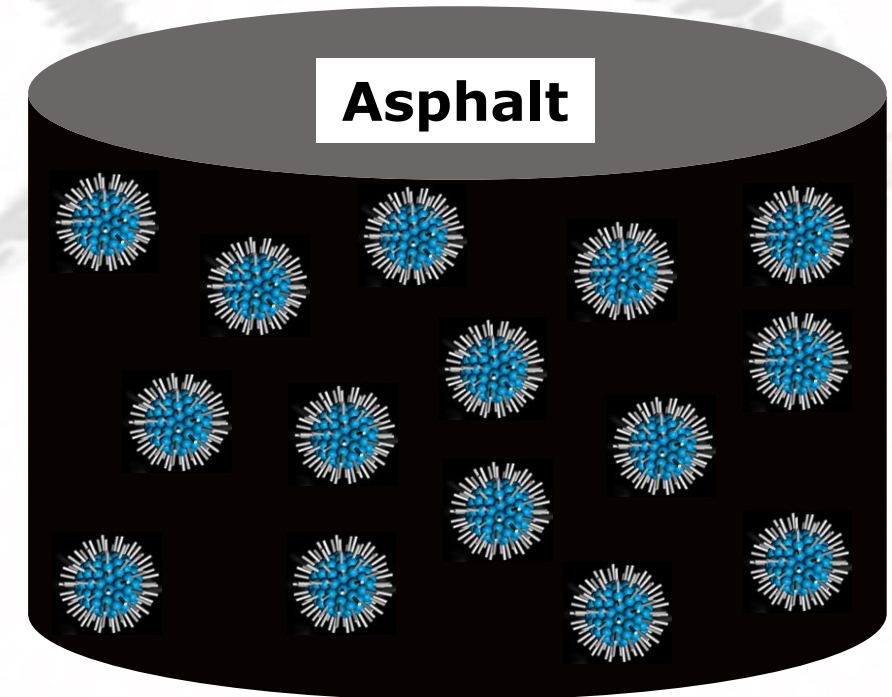


Modifizierung mit einem oberflächenaktiven Additiv

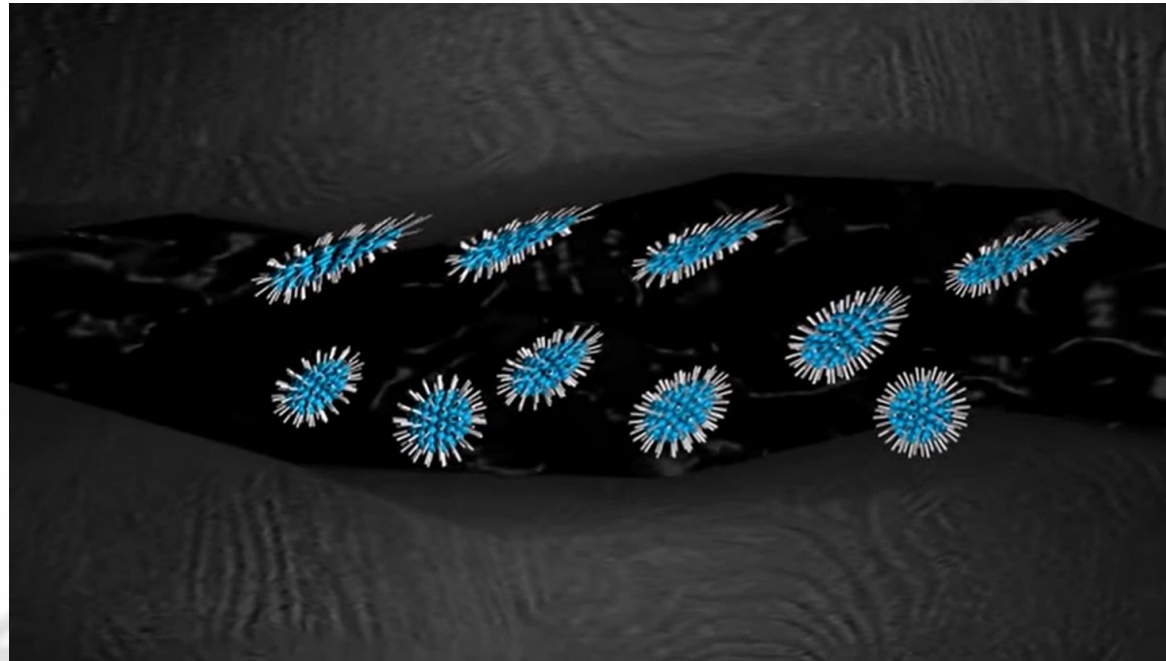
Vernetzungshilfe

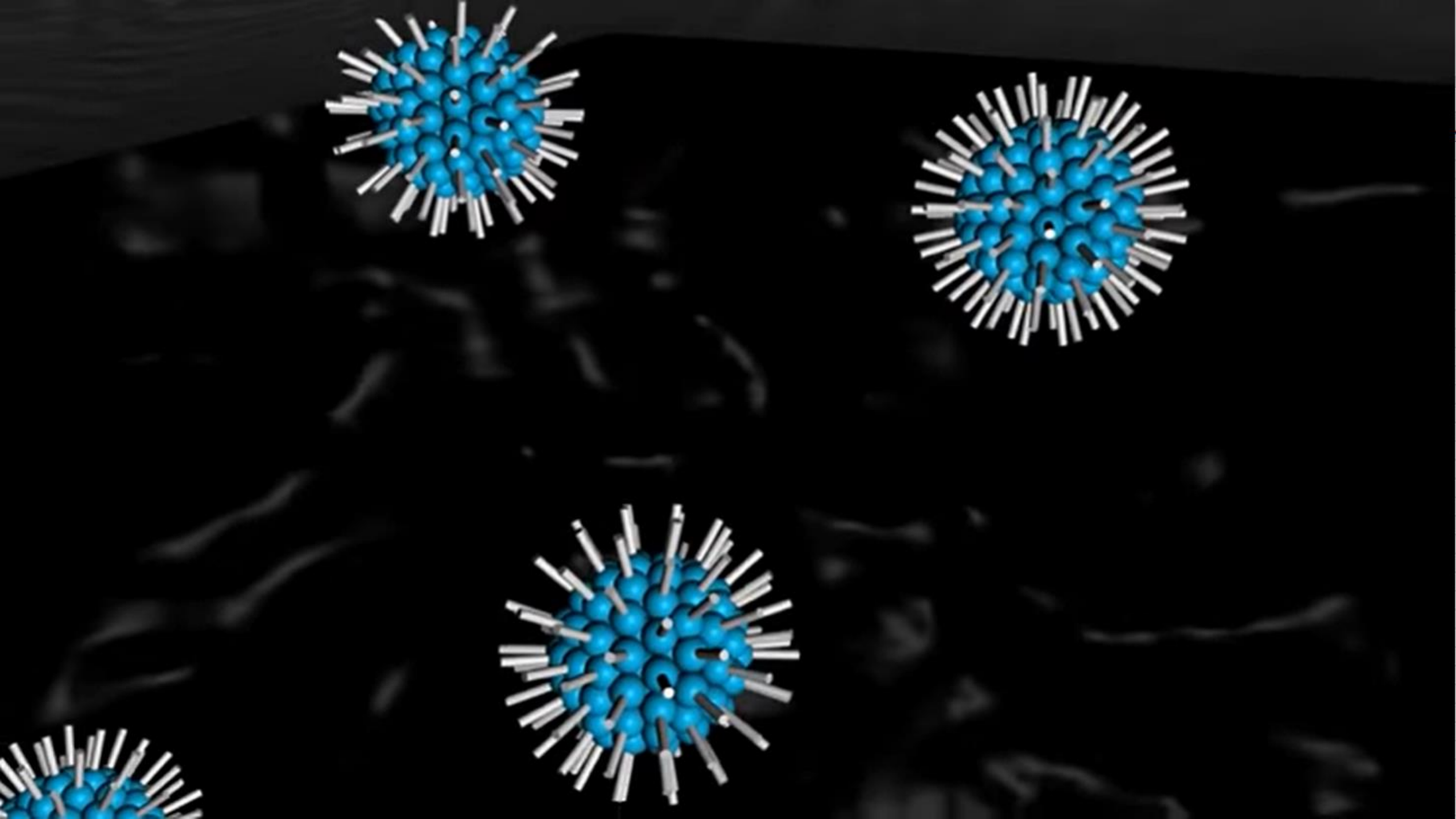


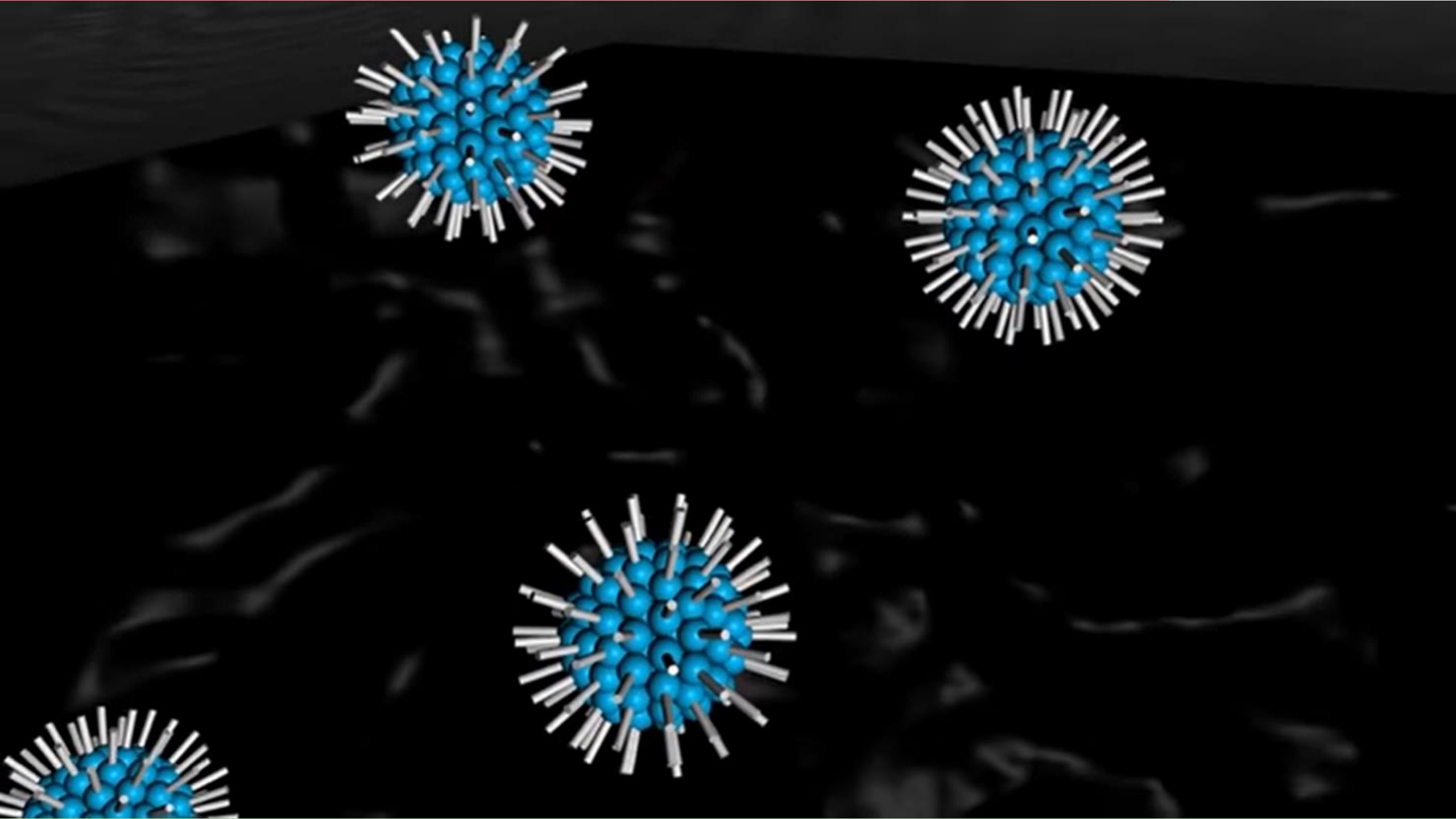
Verdichtungshilfe

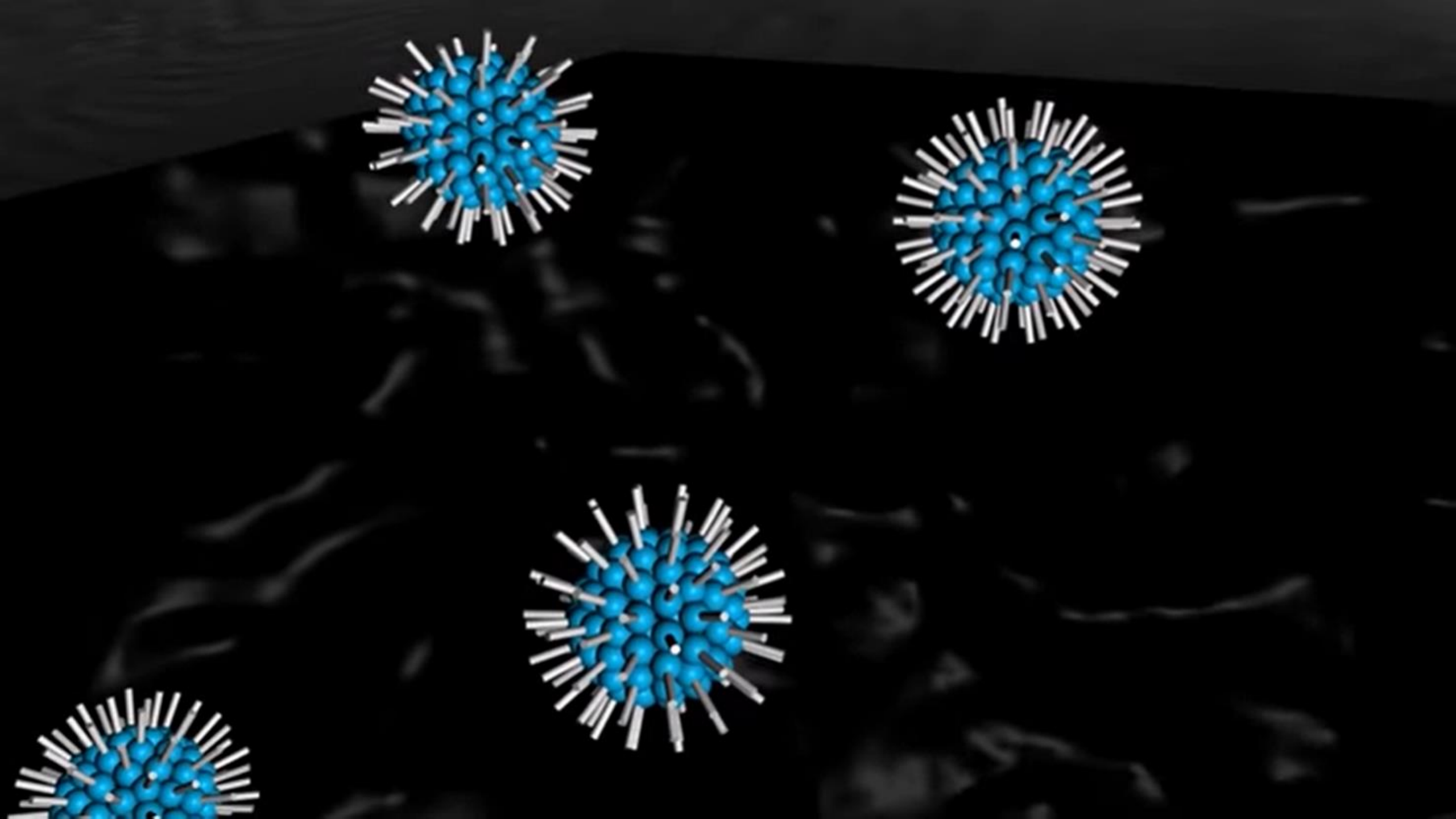


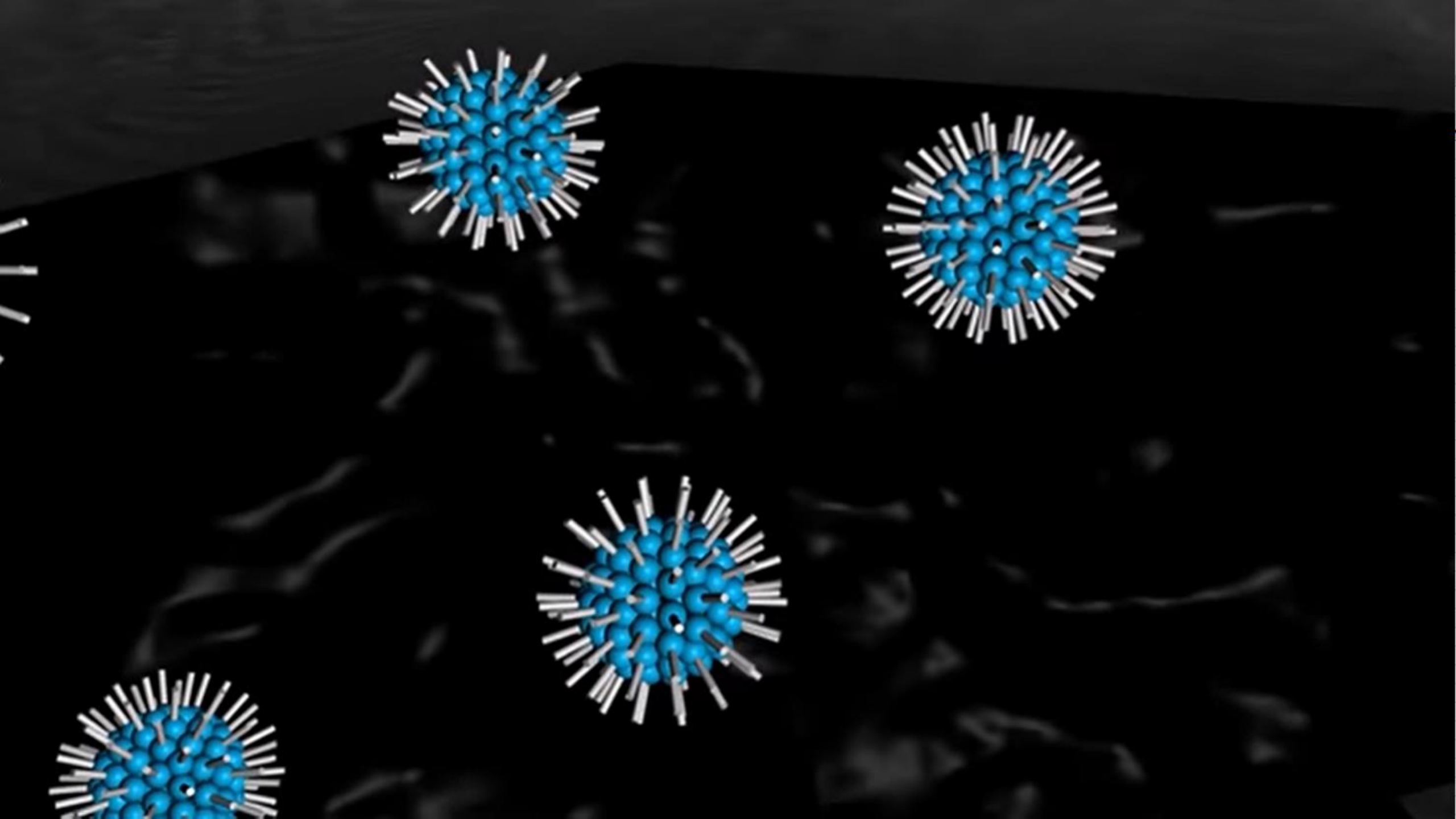
Verdichtung

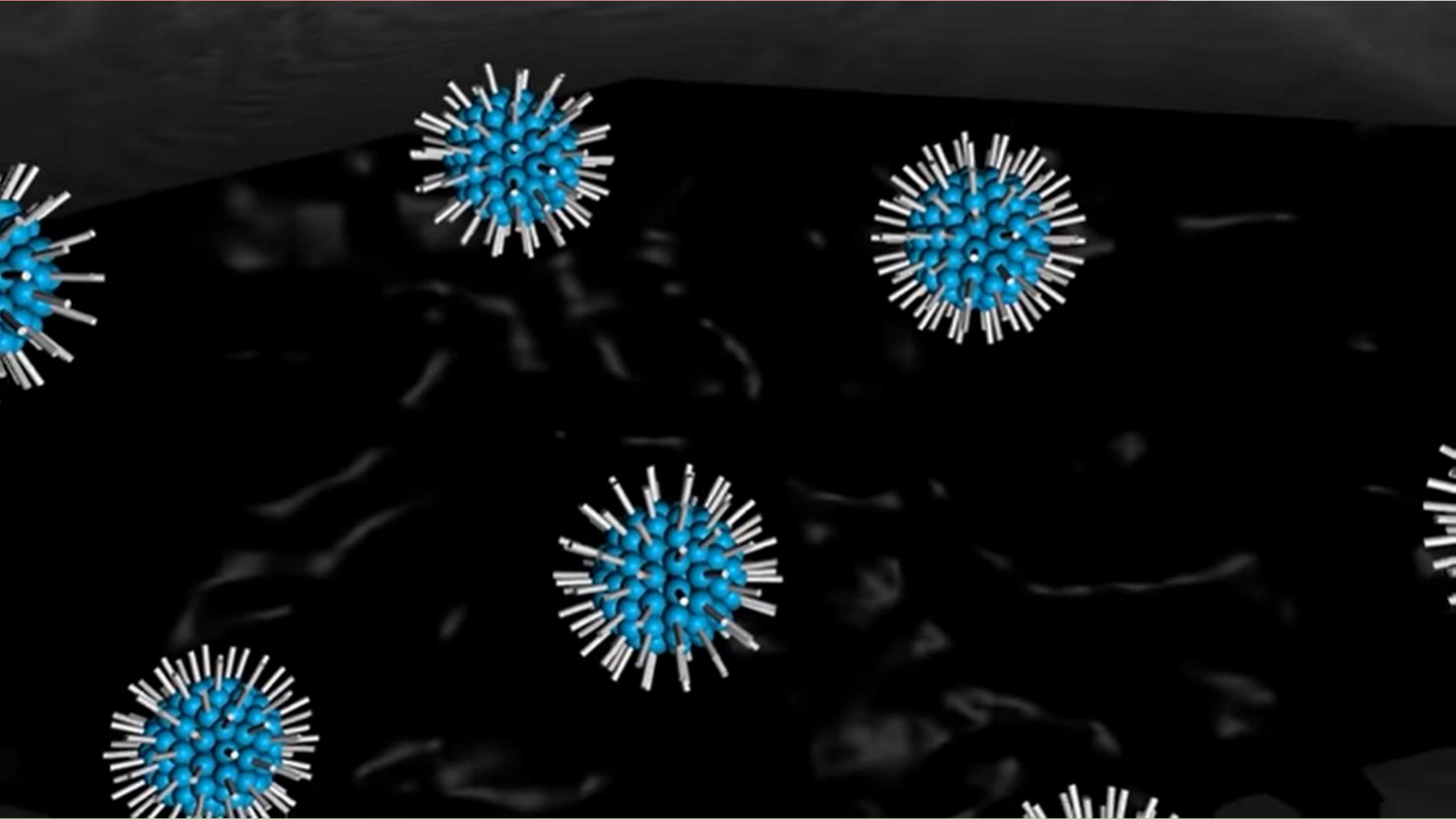


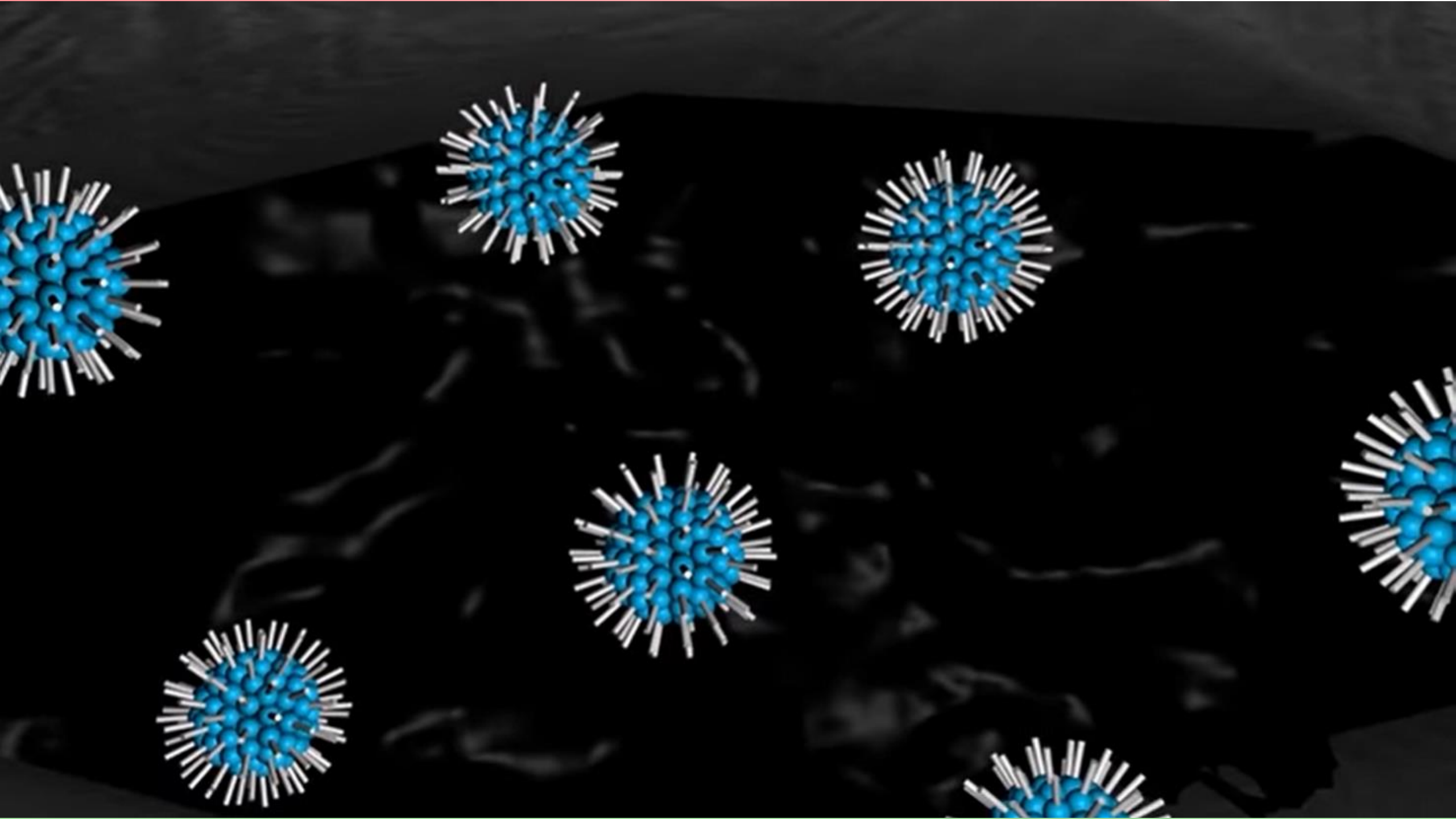


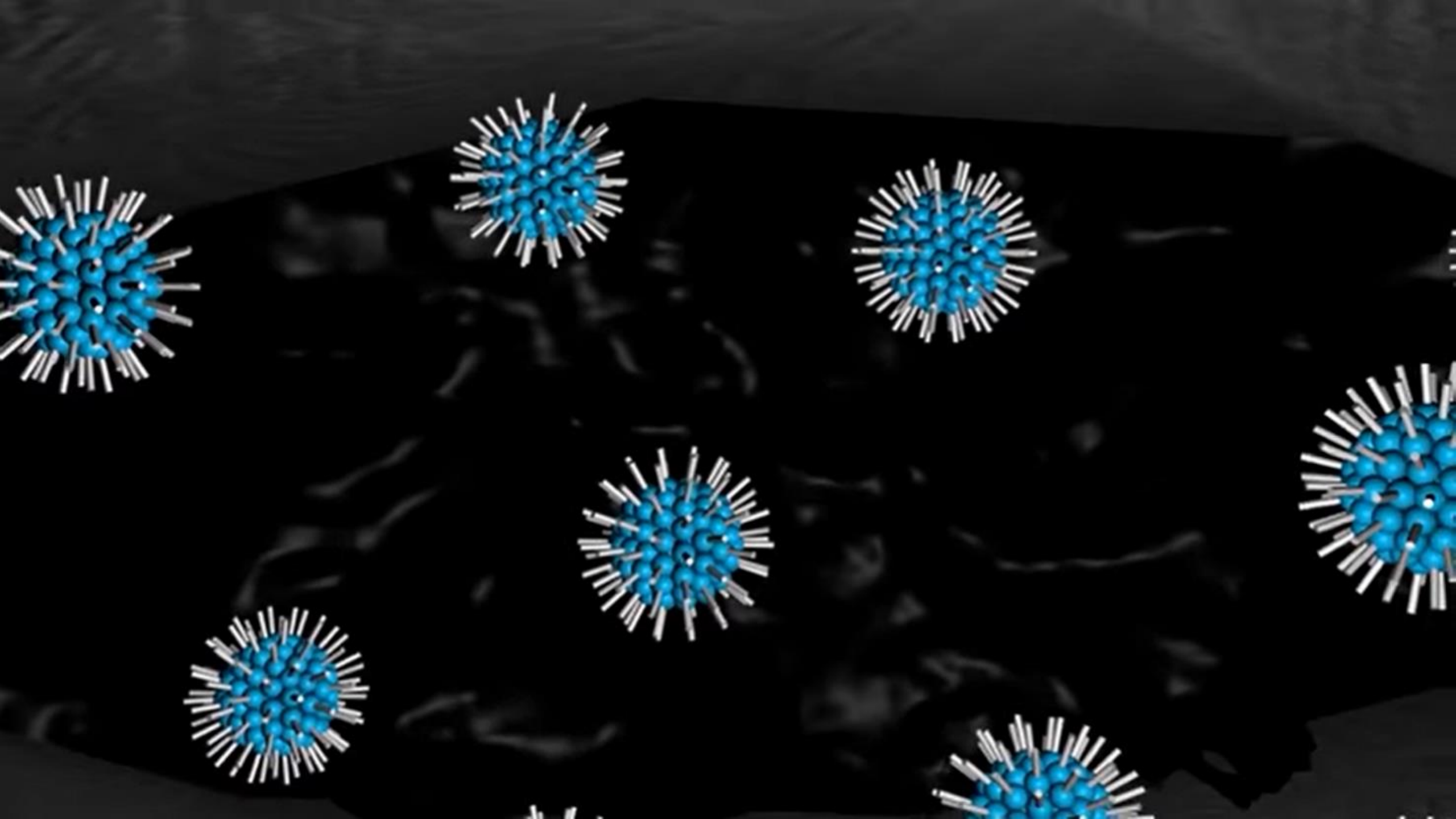


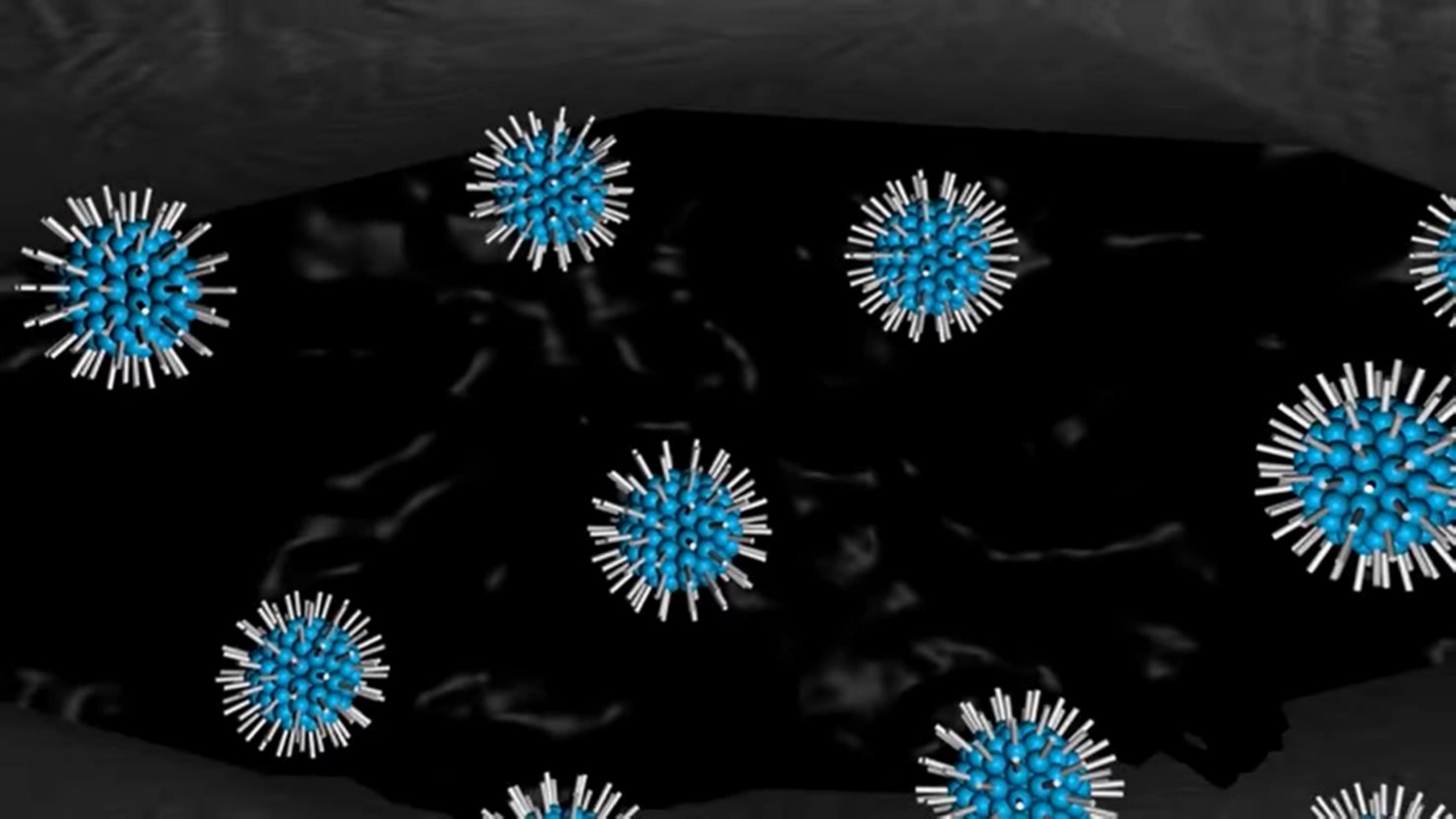


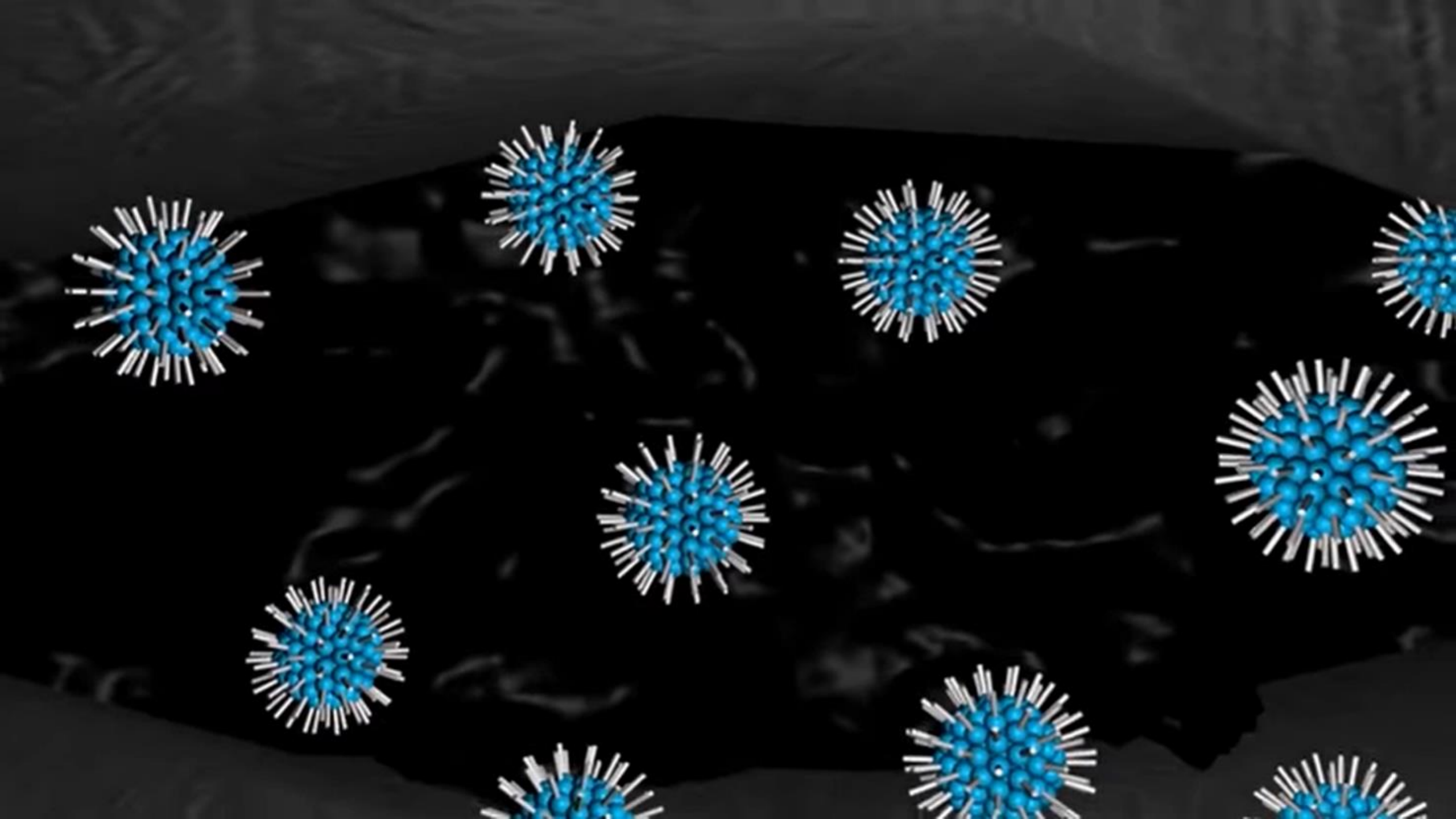


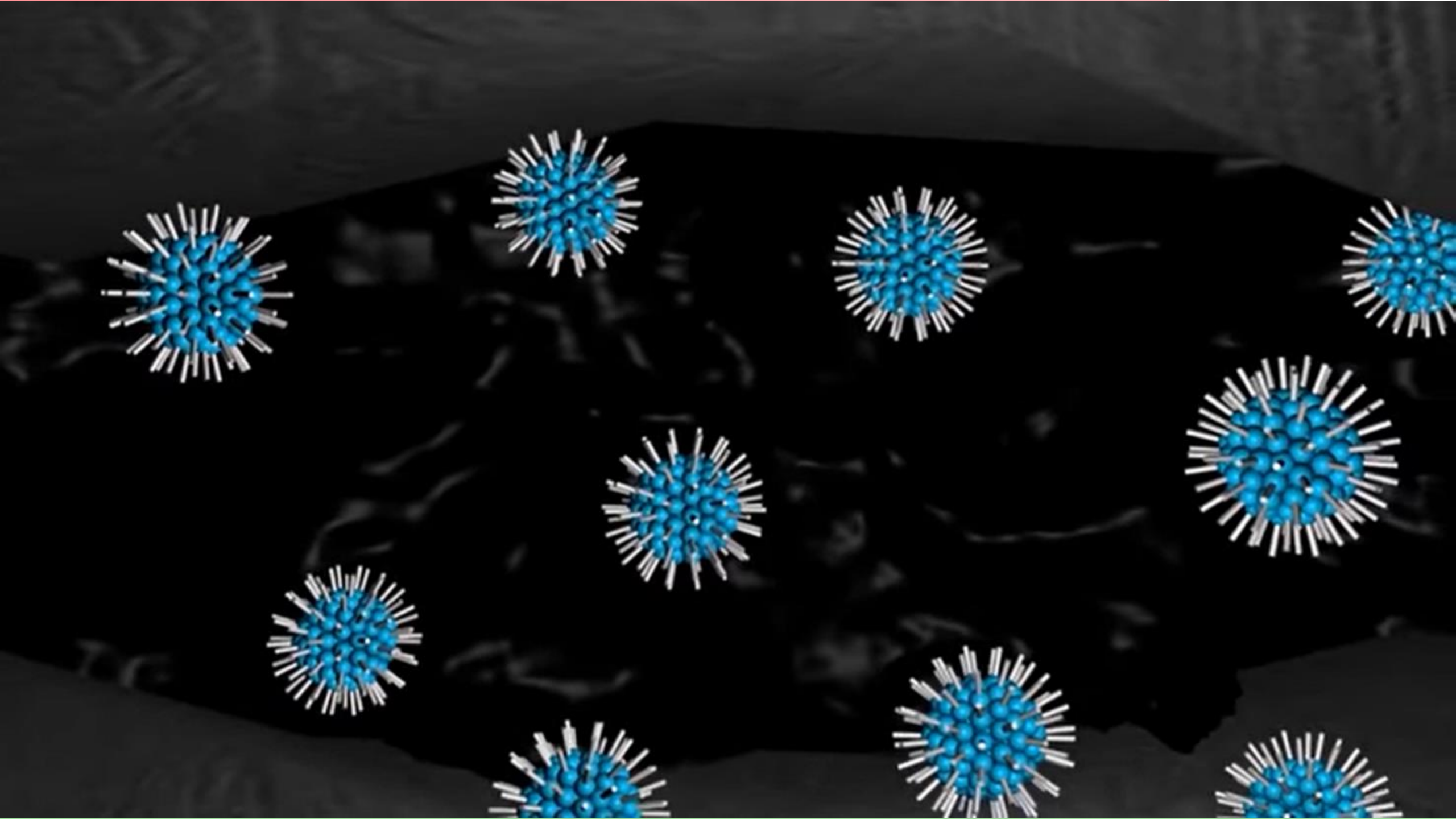


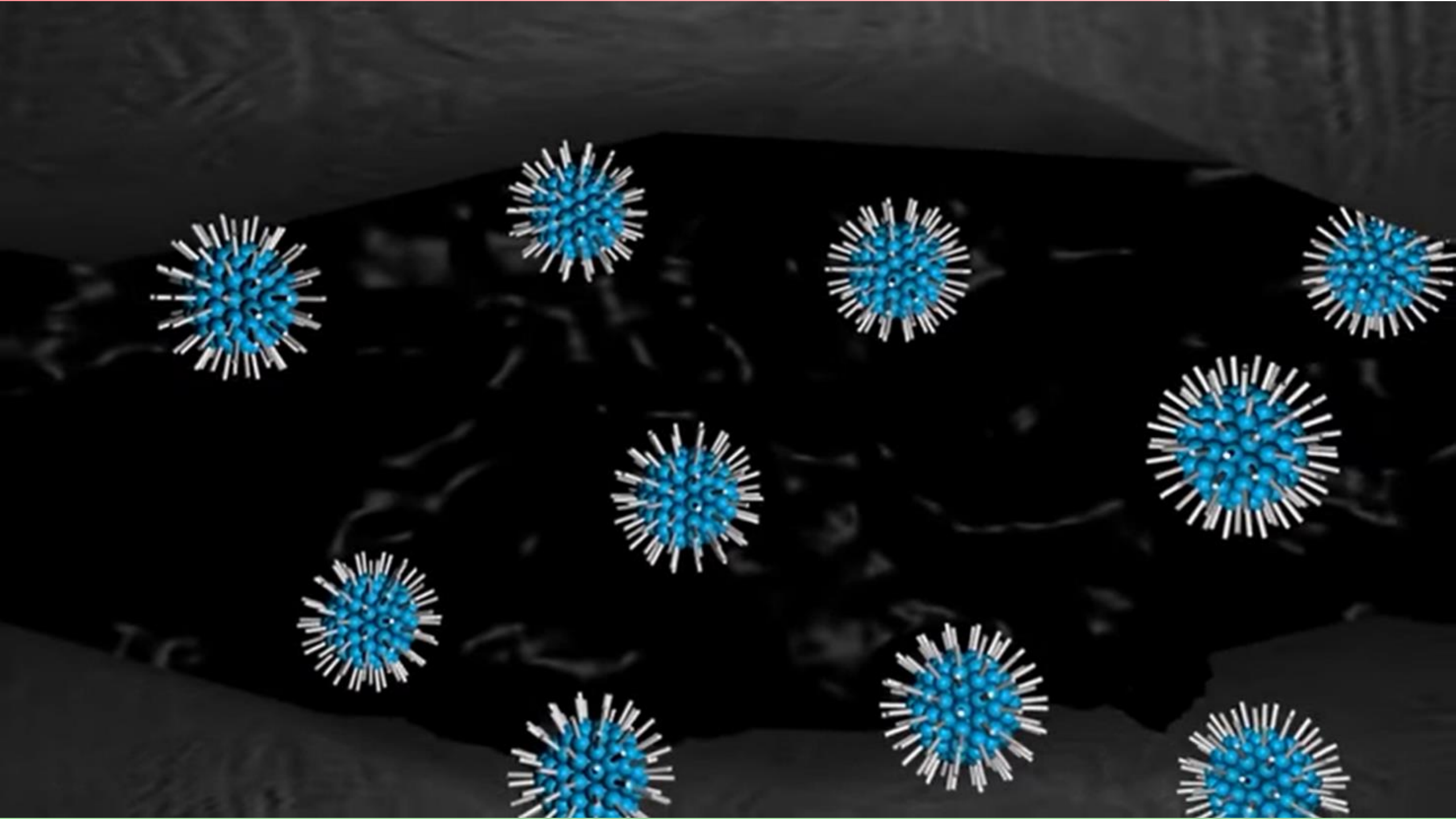


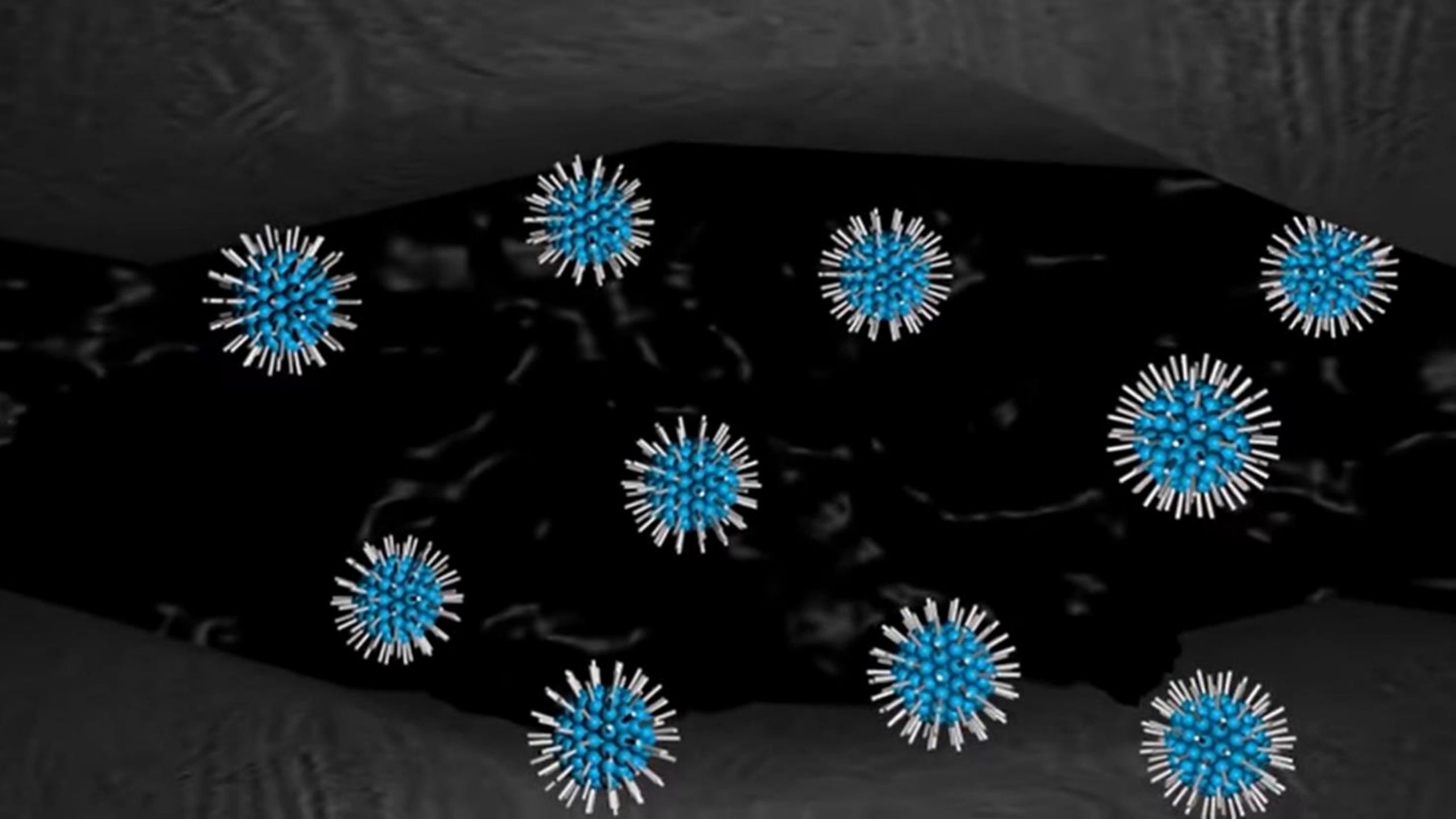


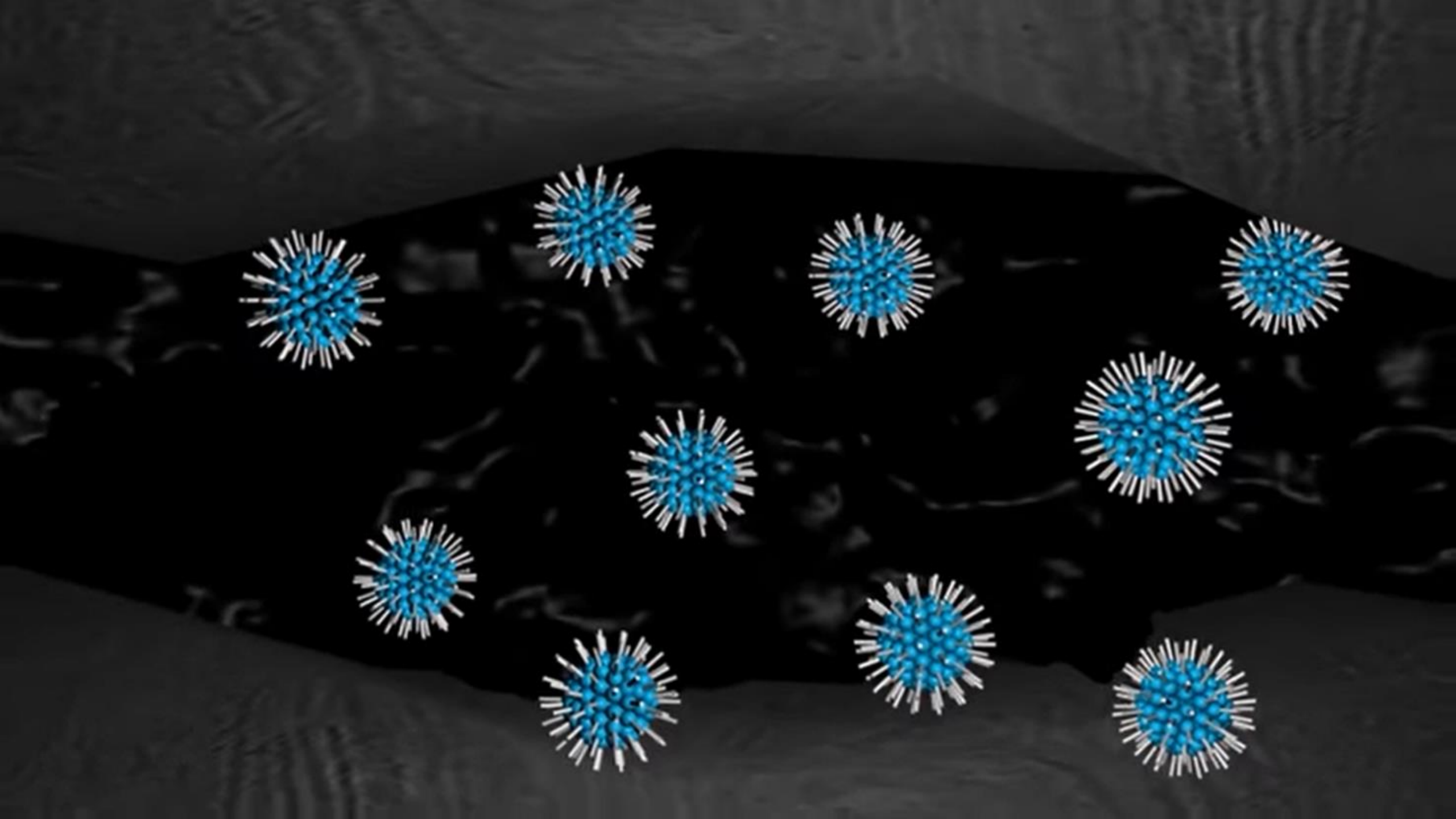


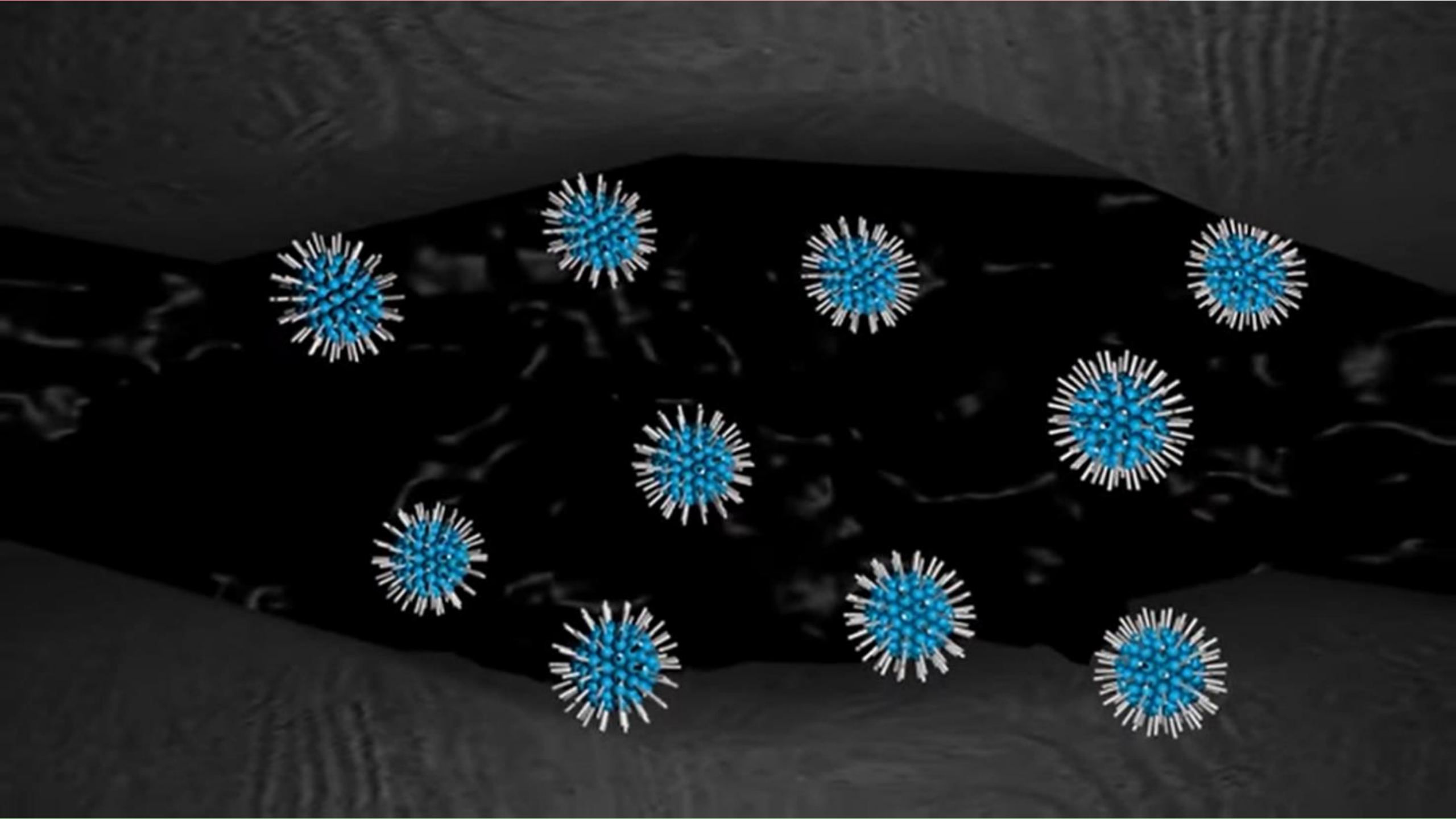


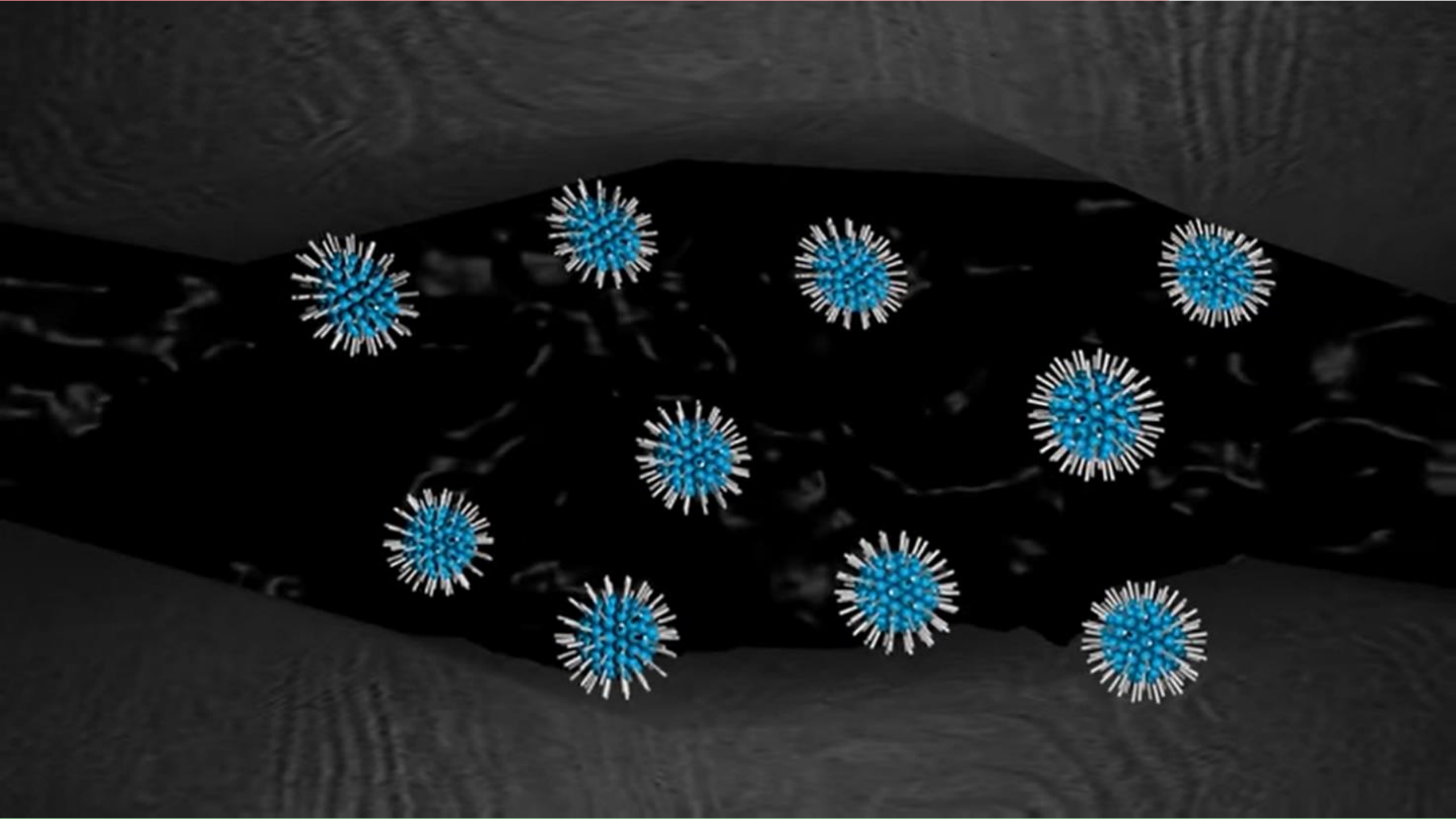


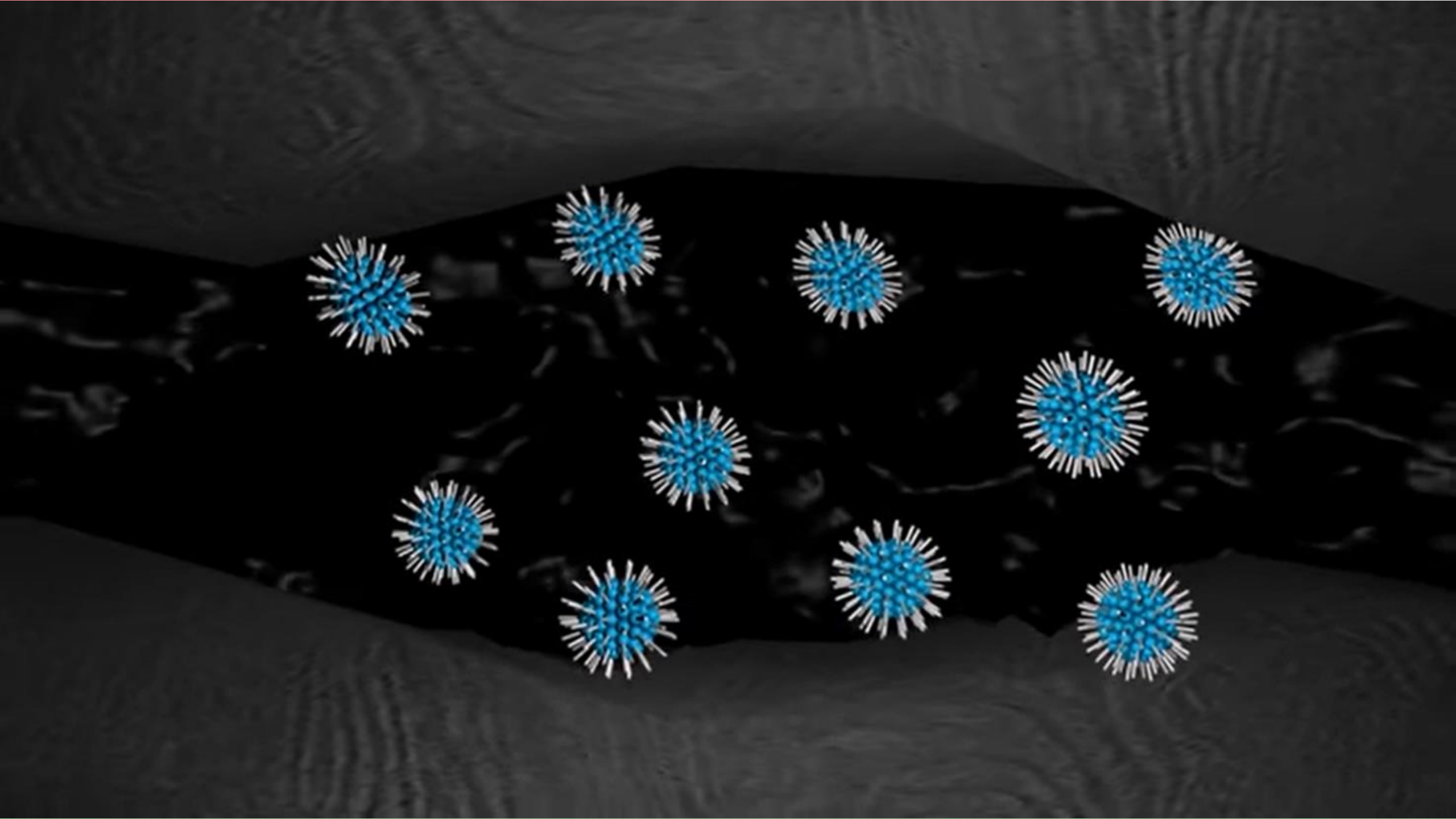


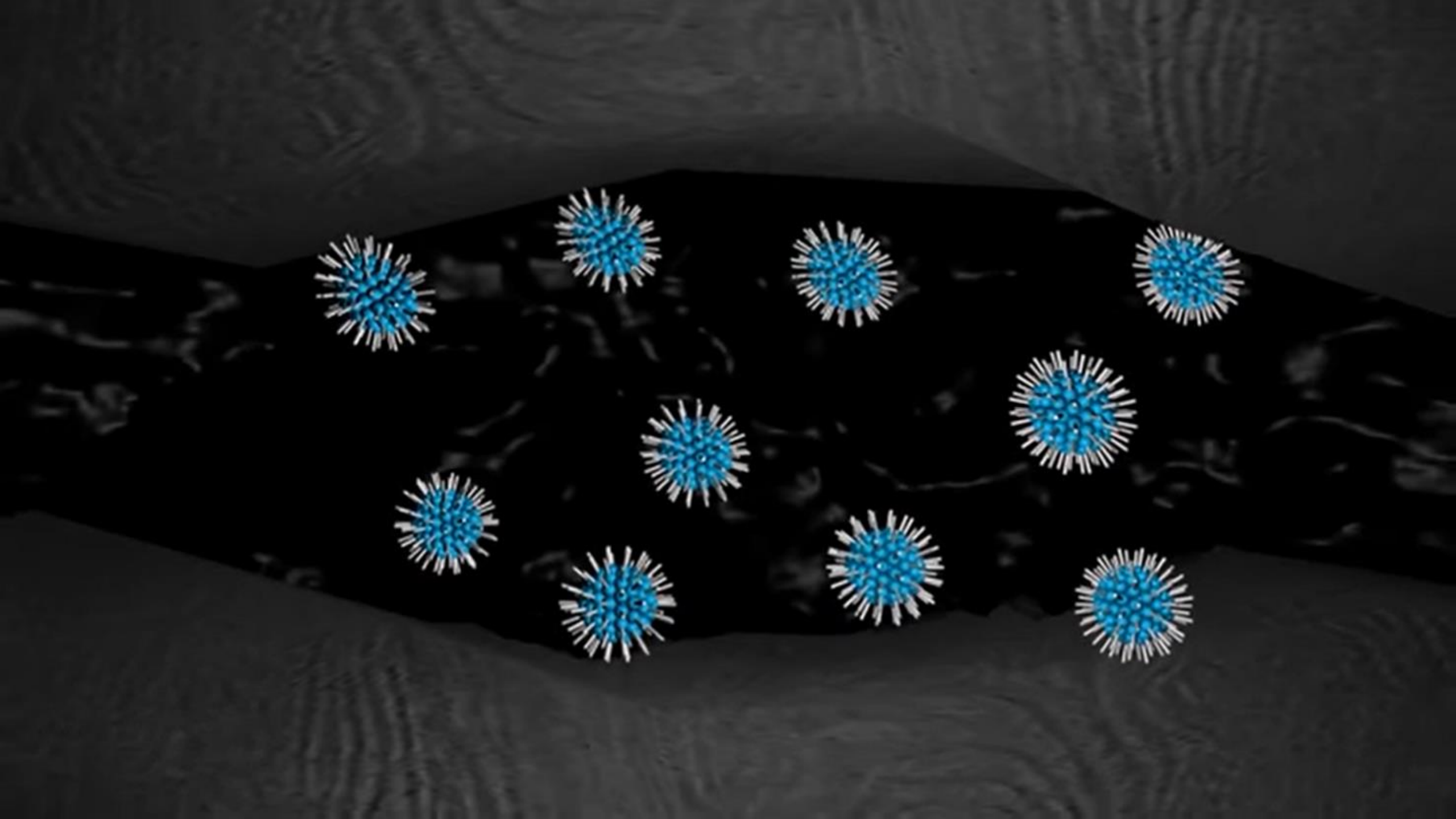


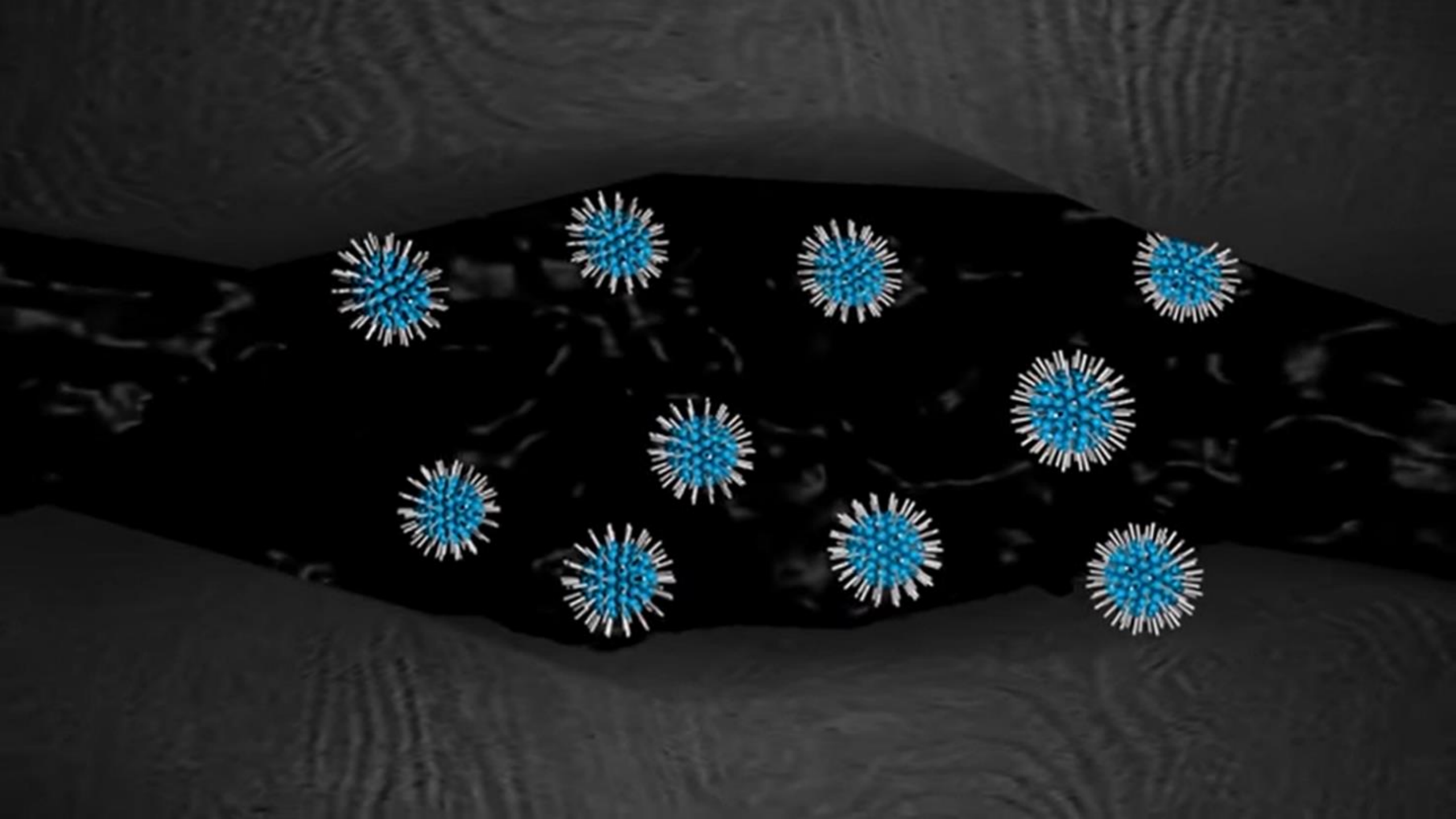


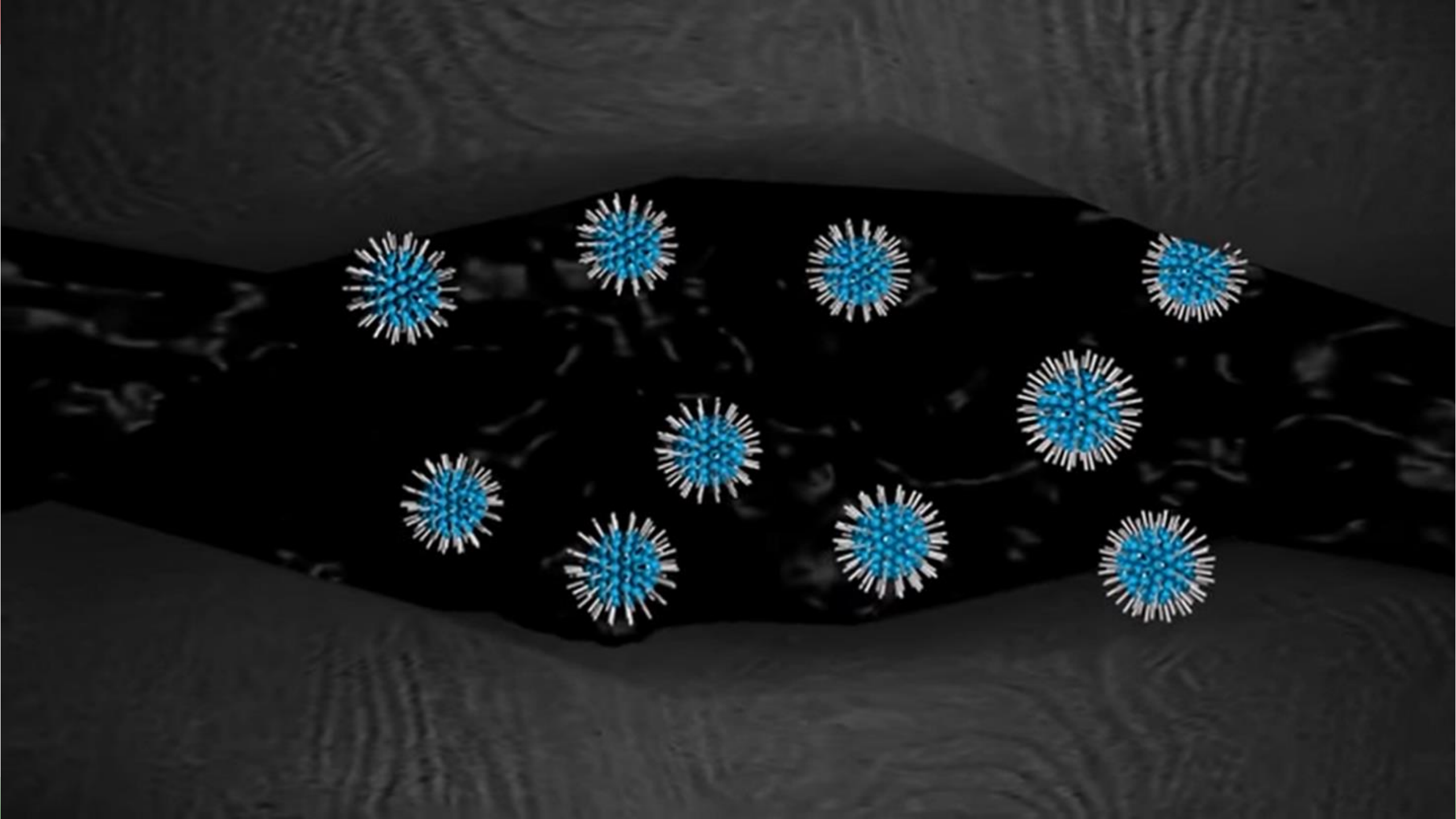


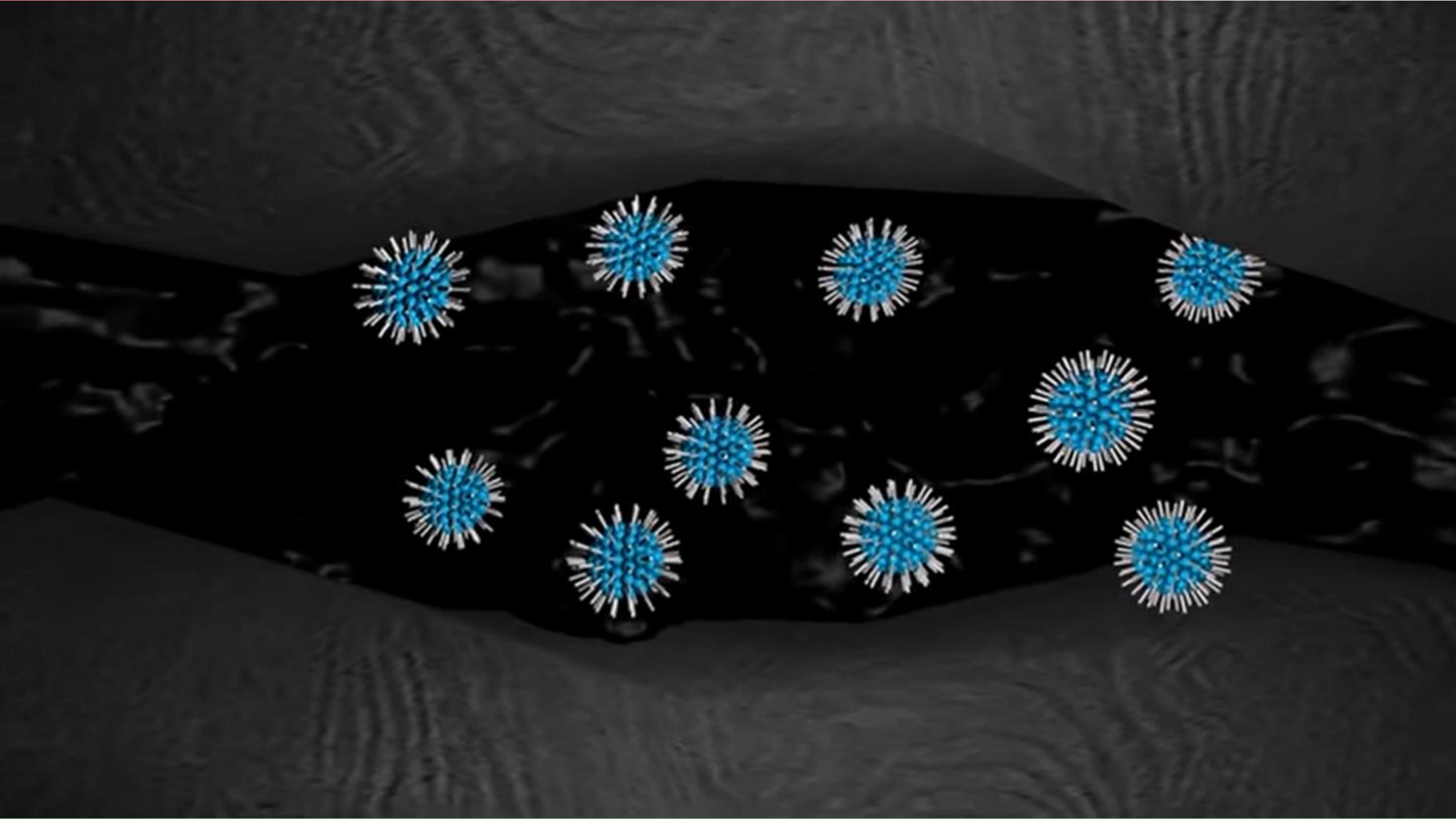


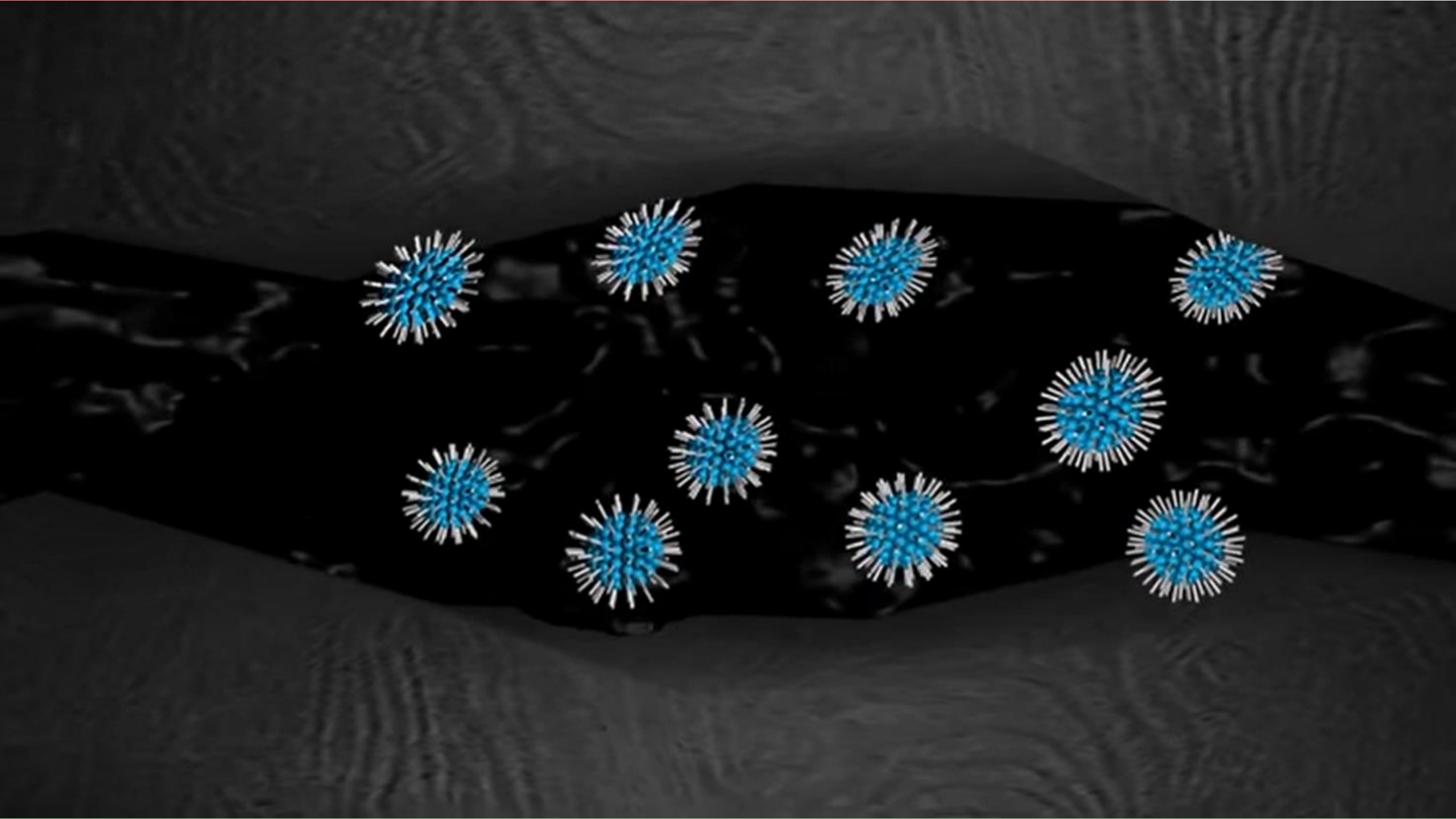


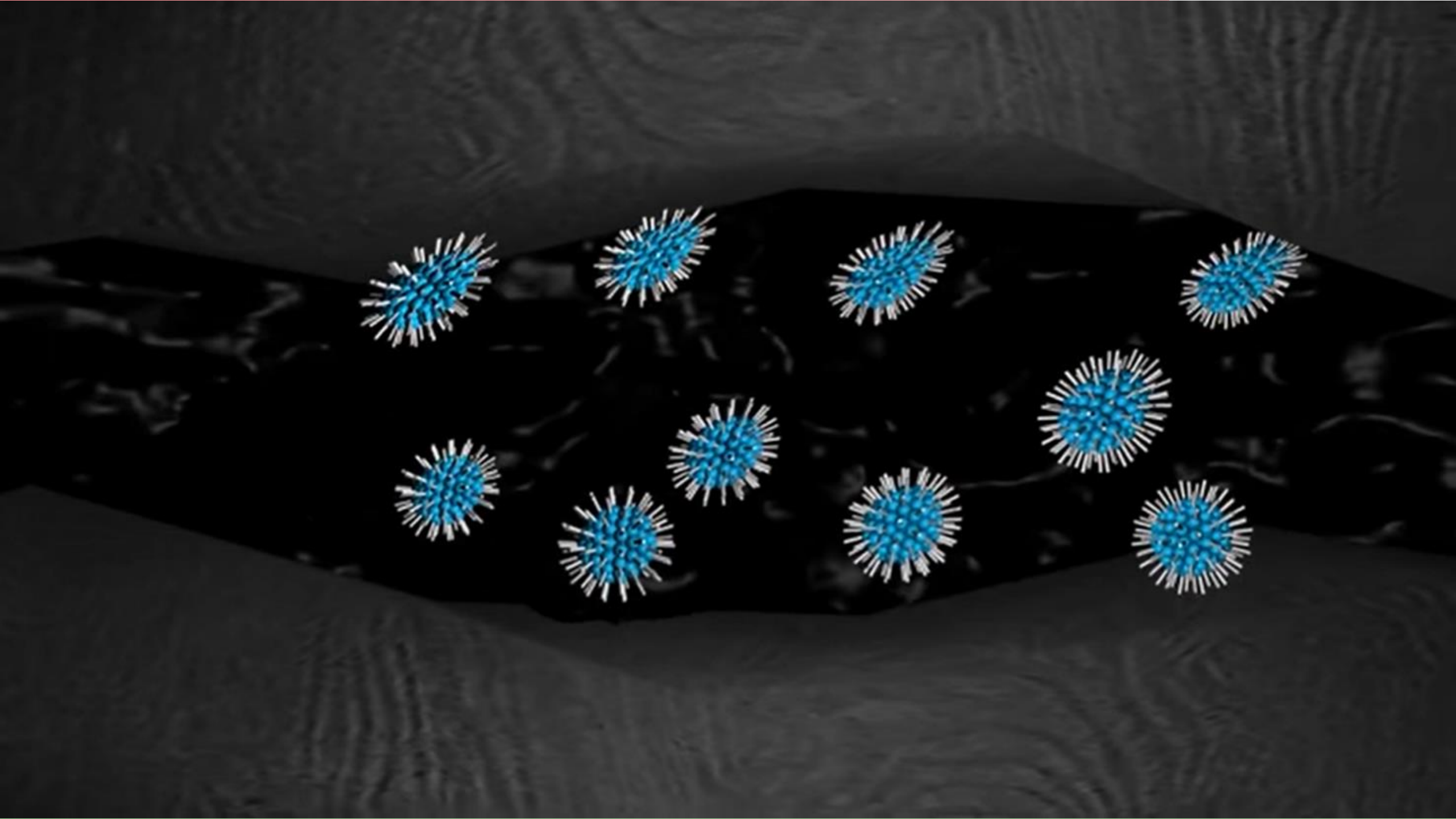


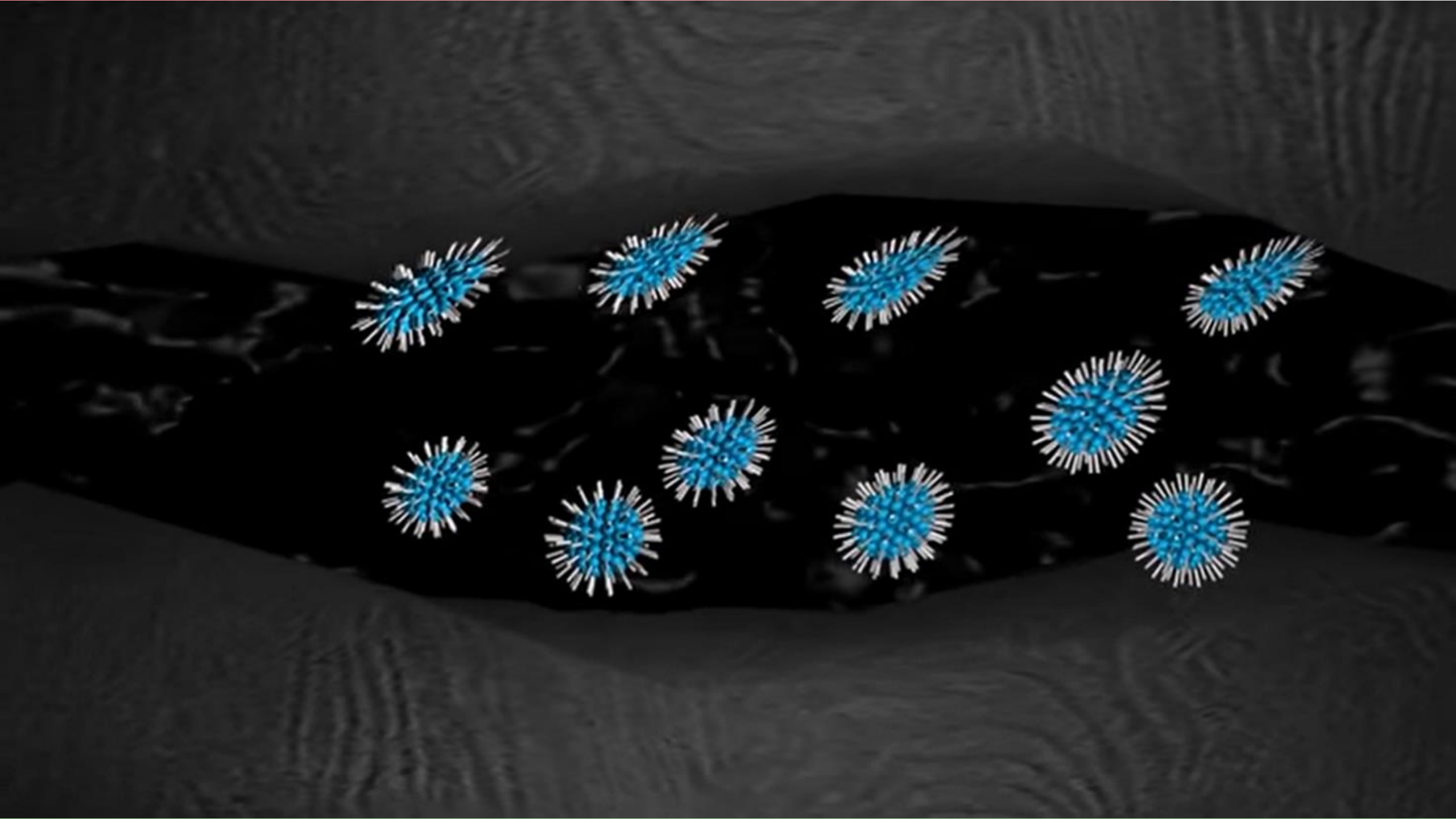


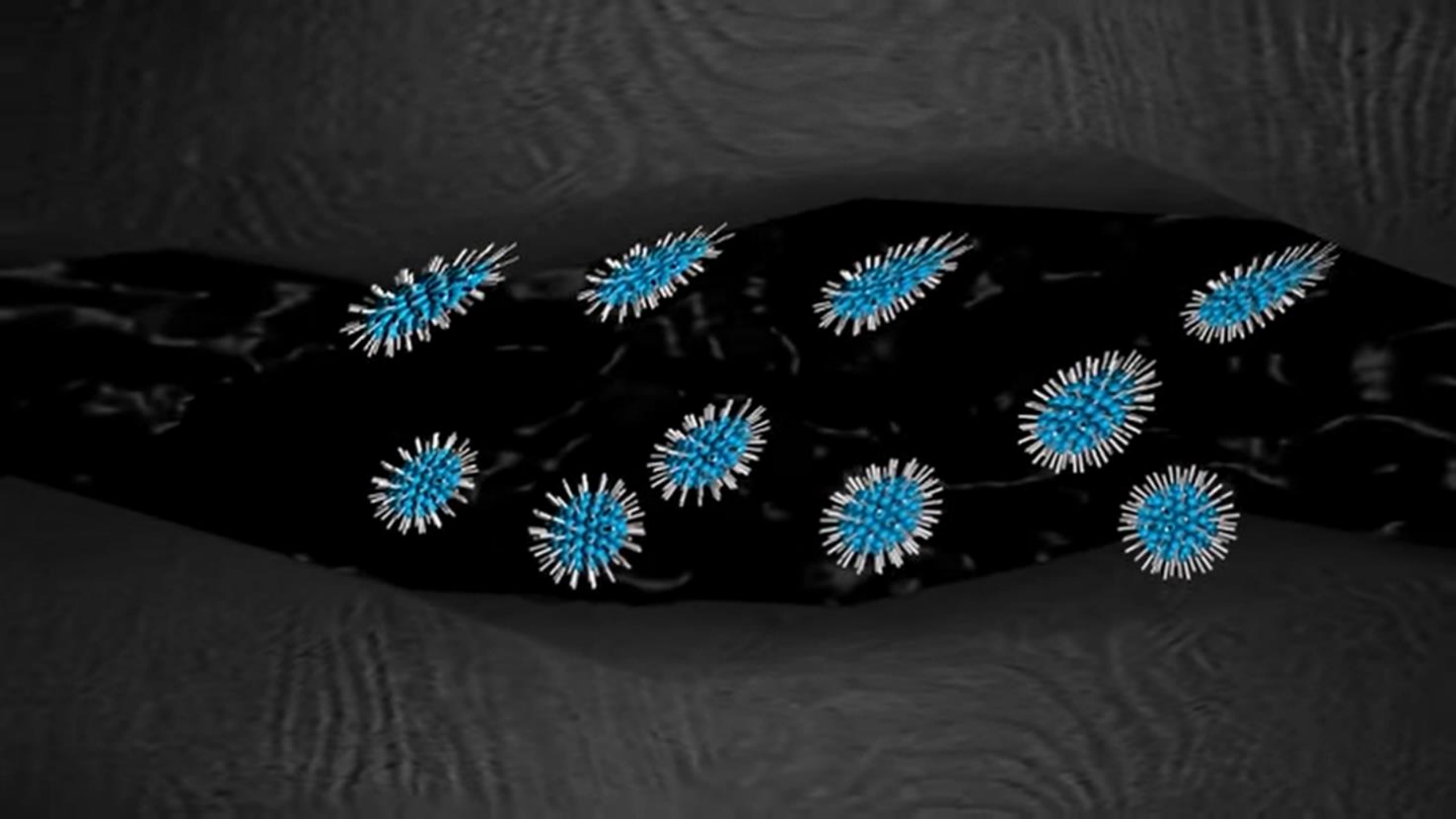


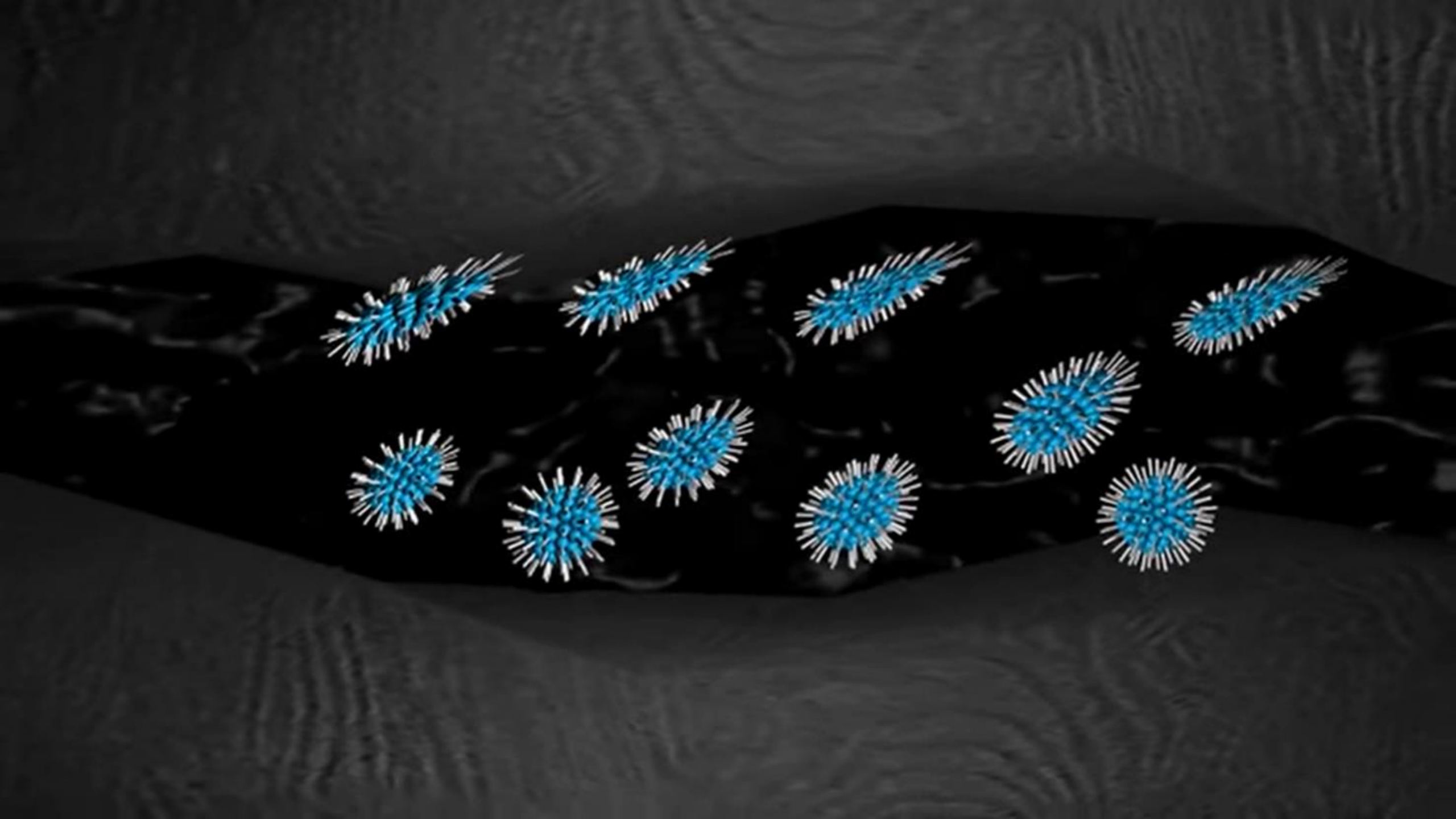


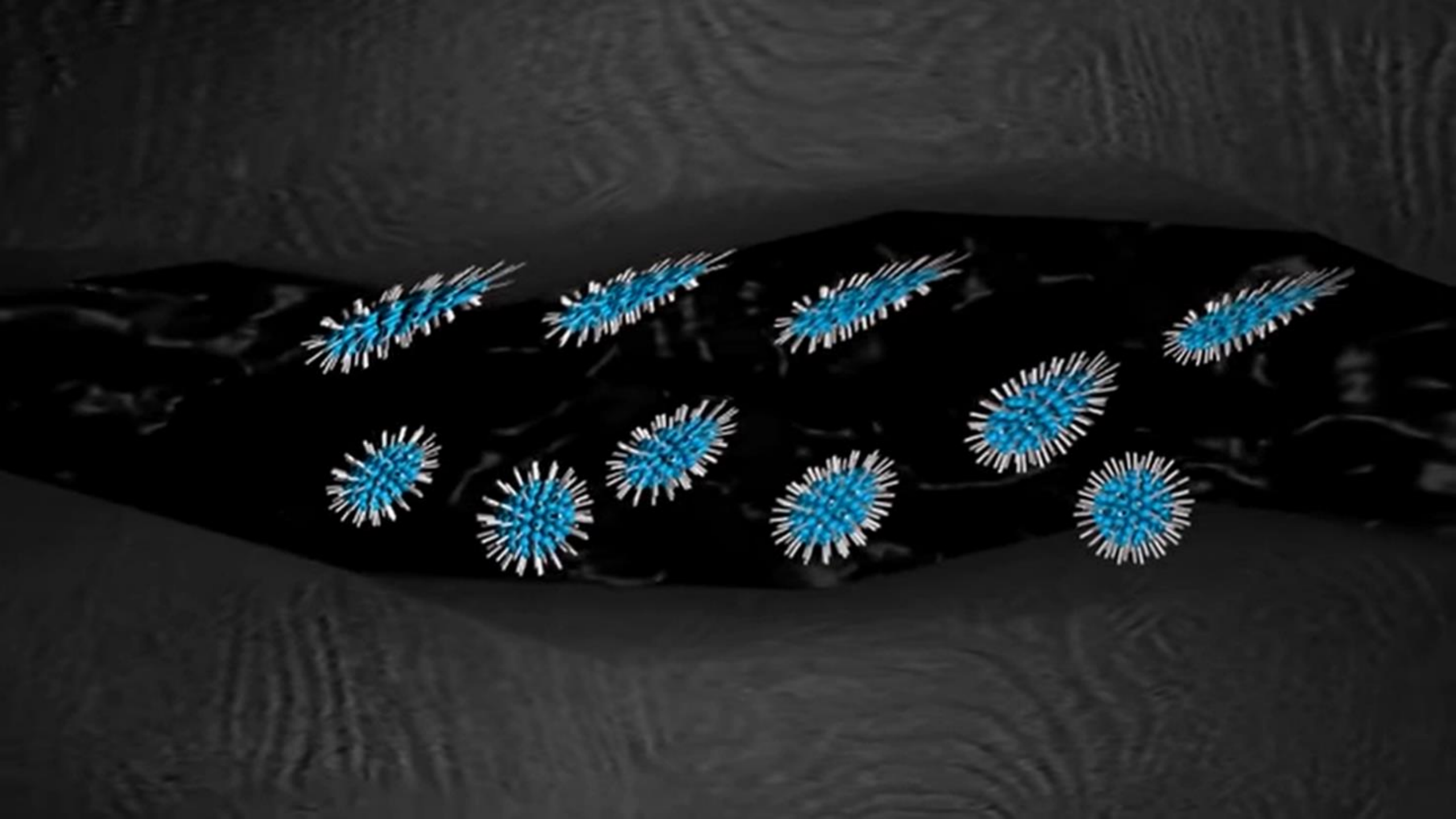


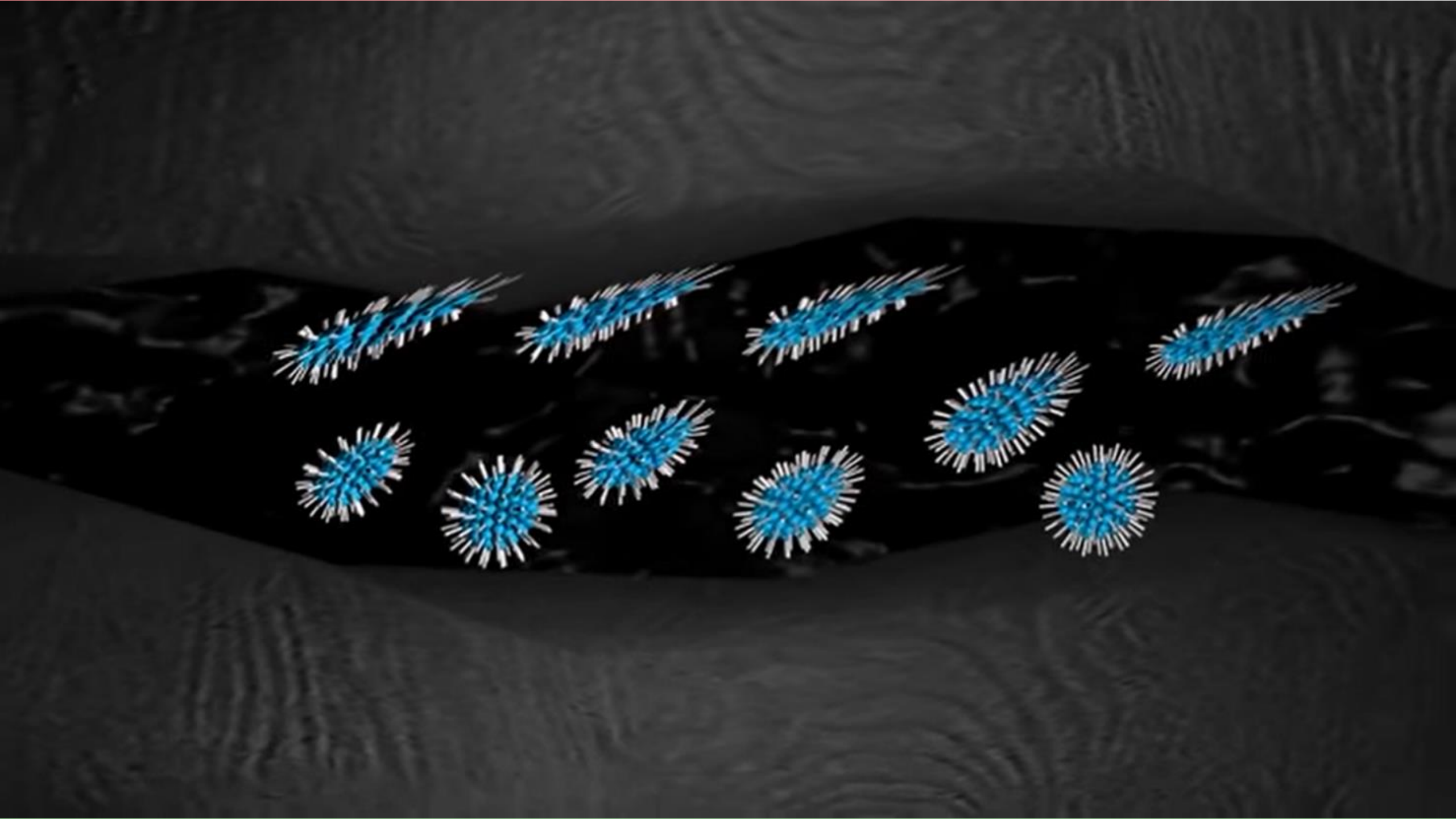


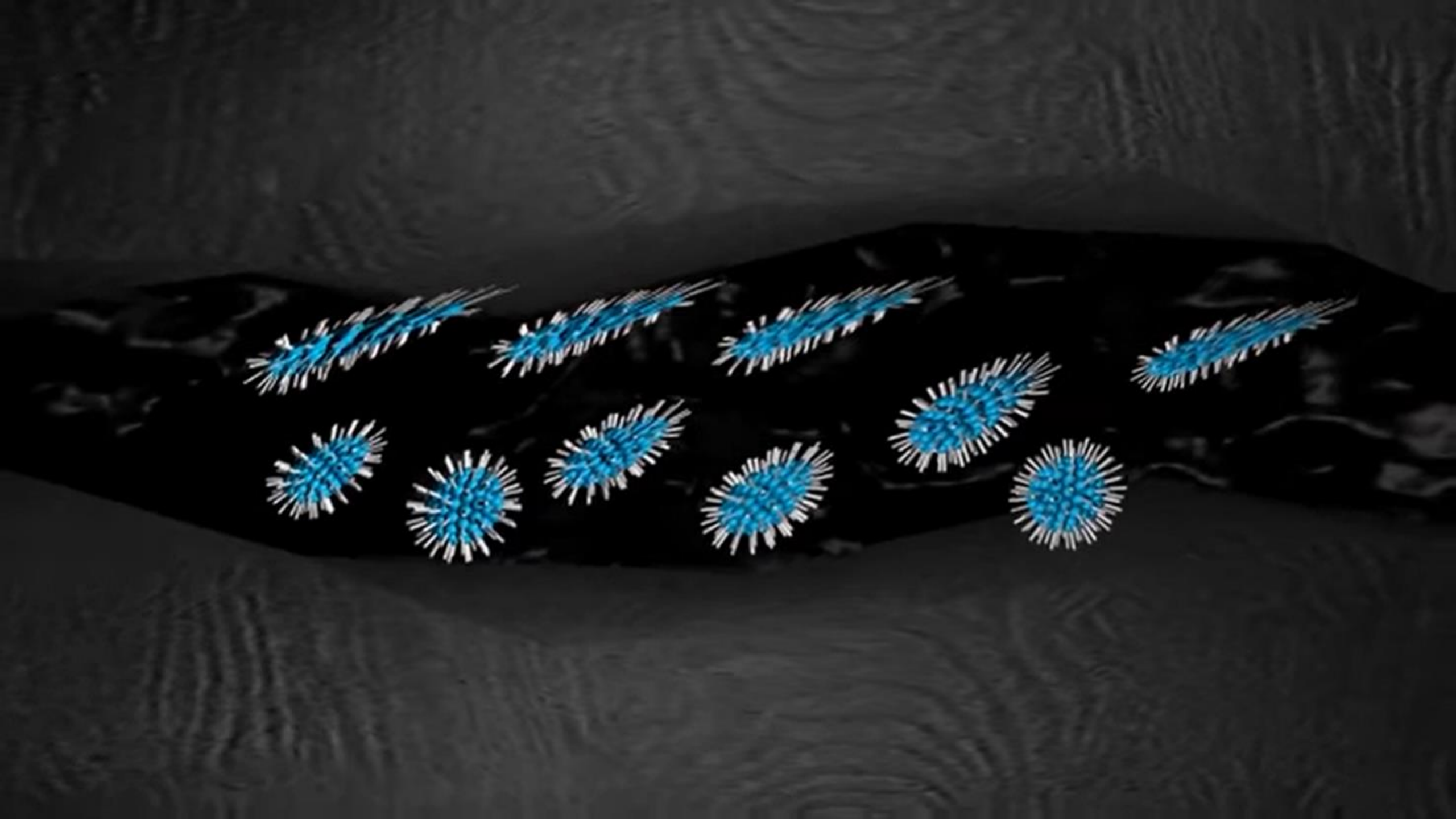


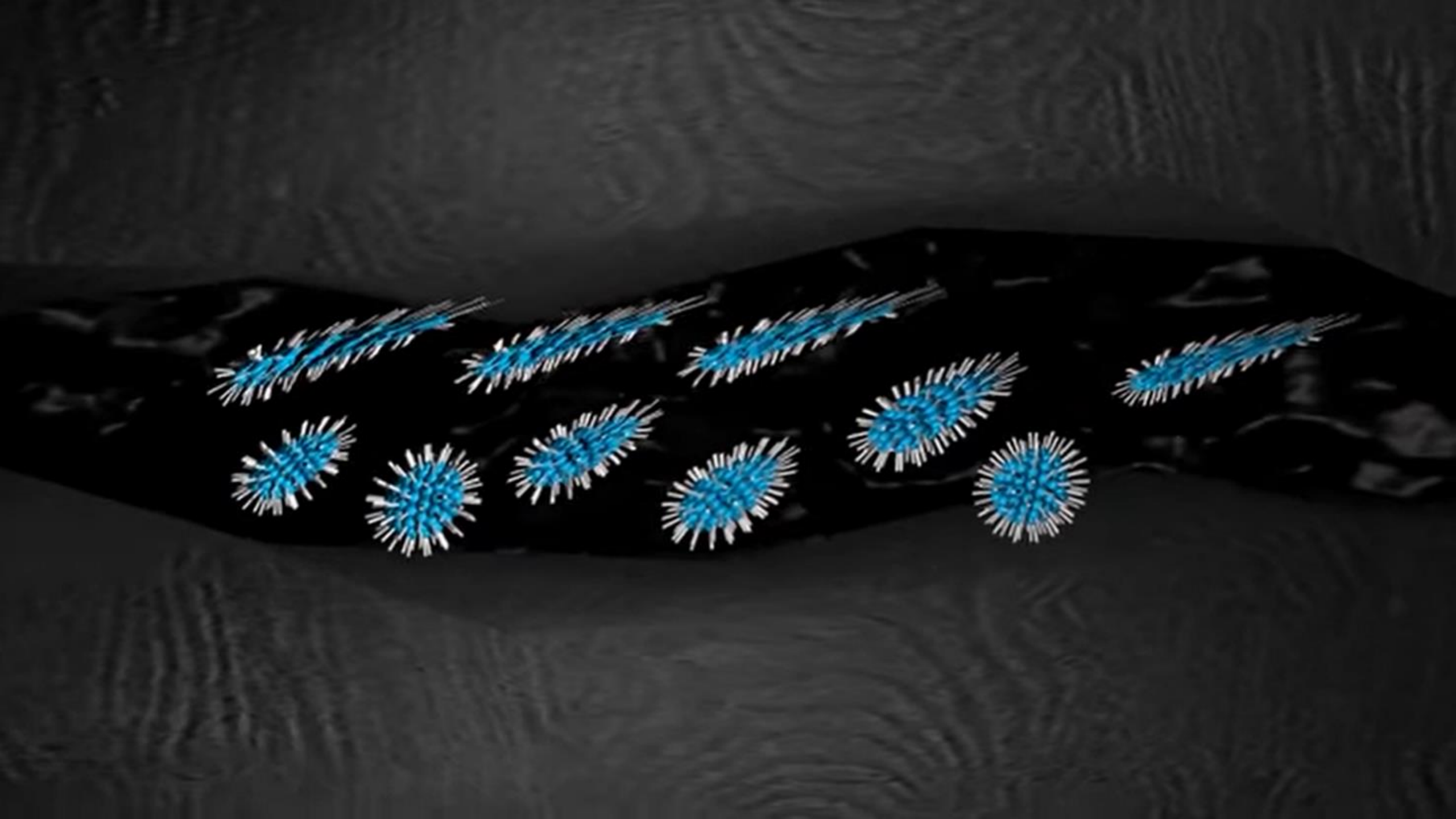


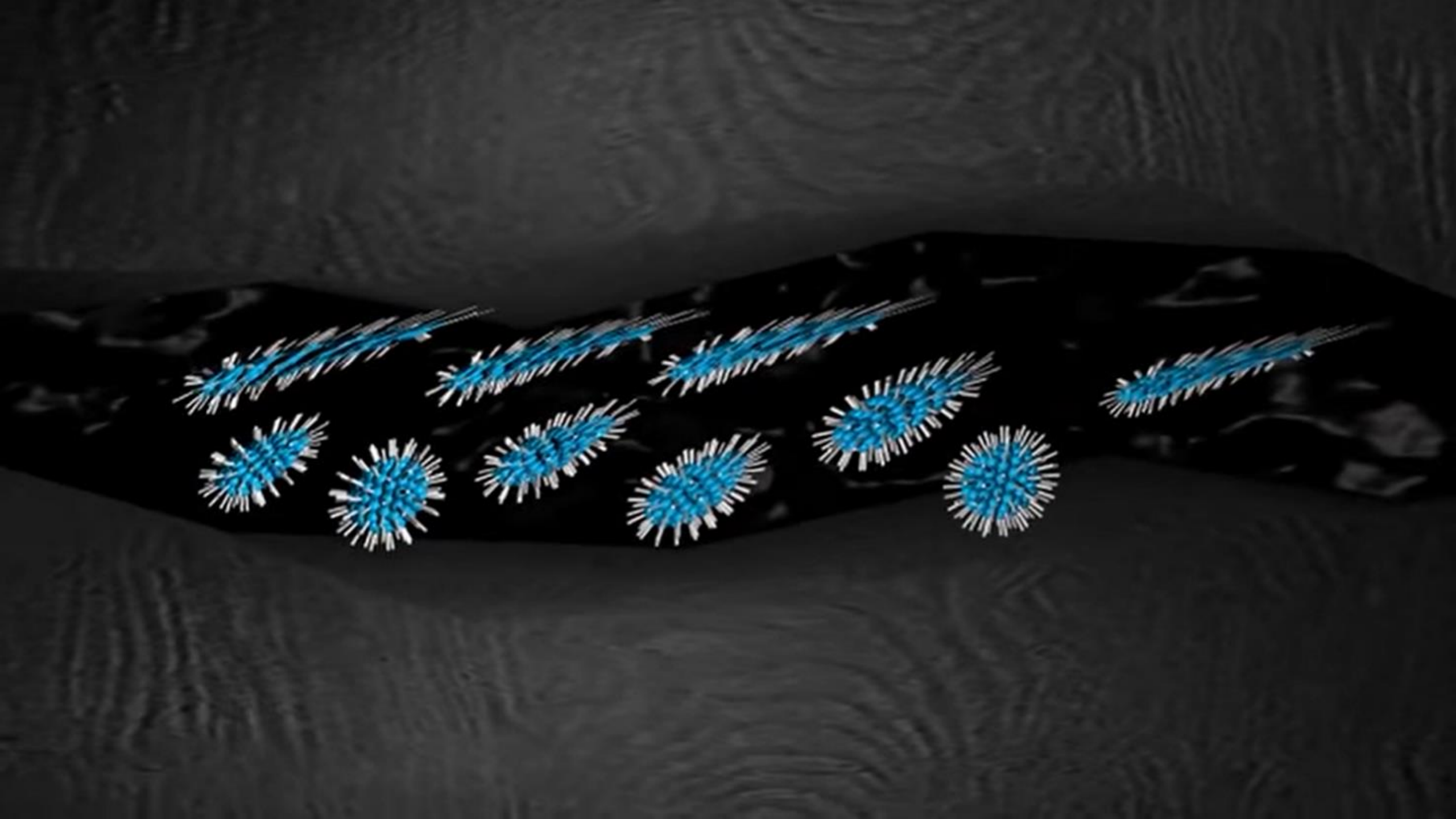


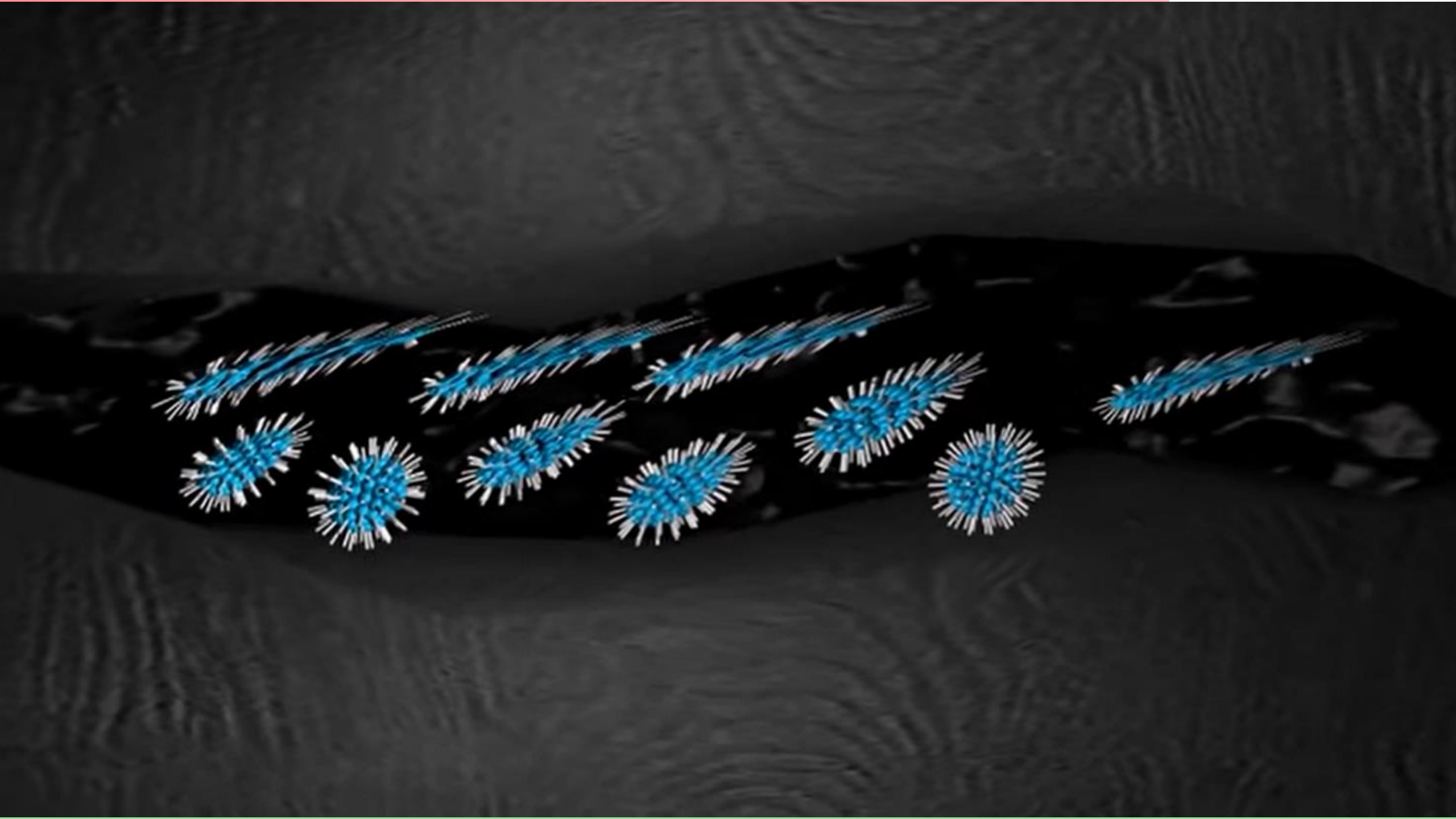


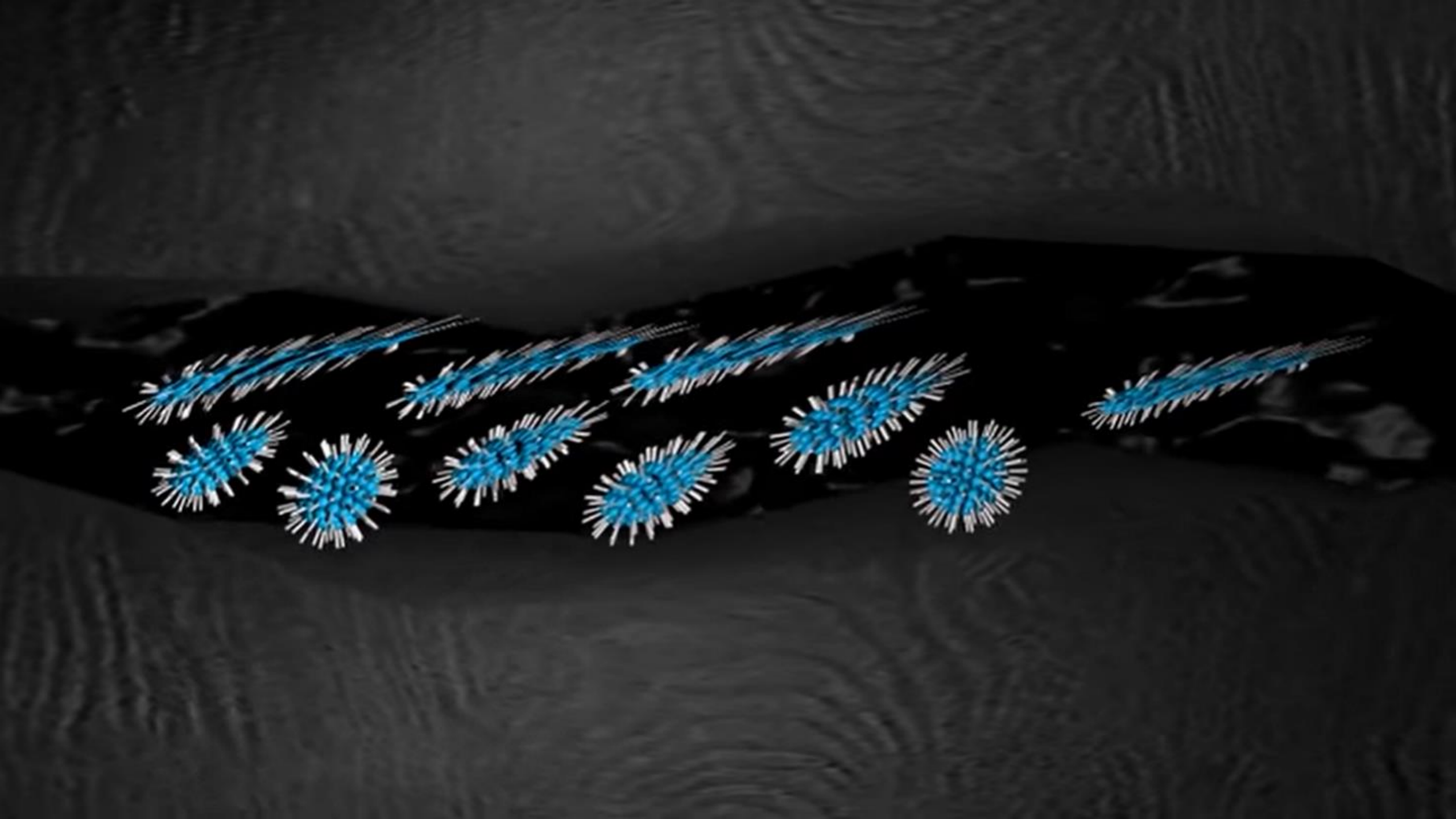


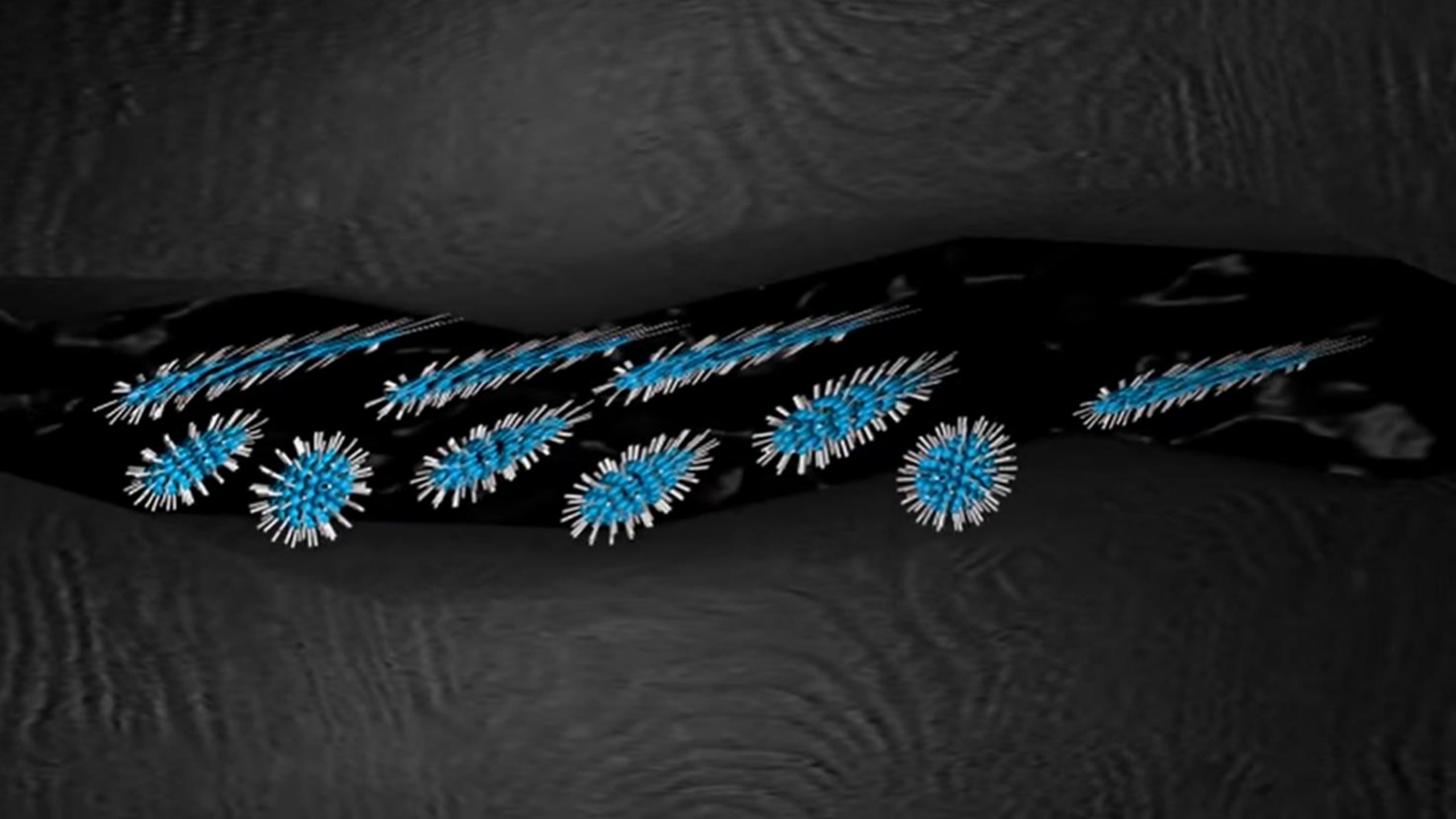


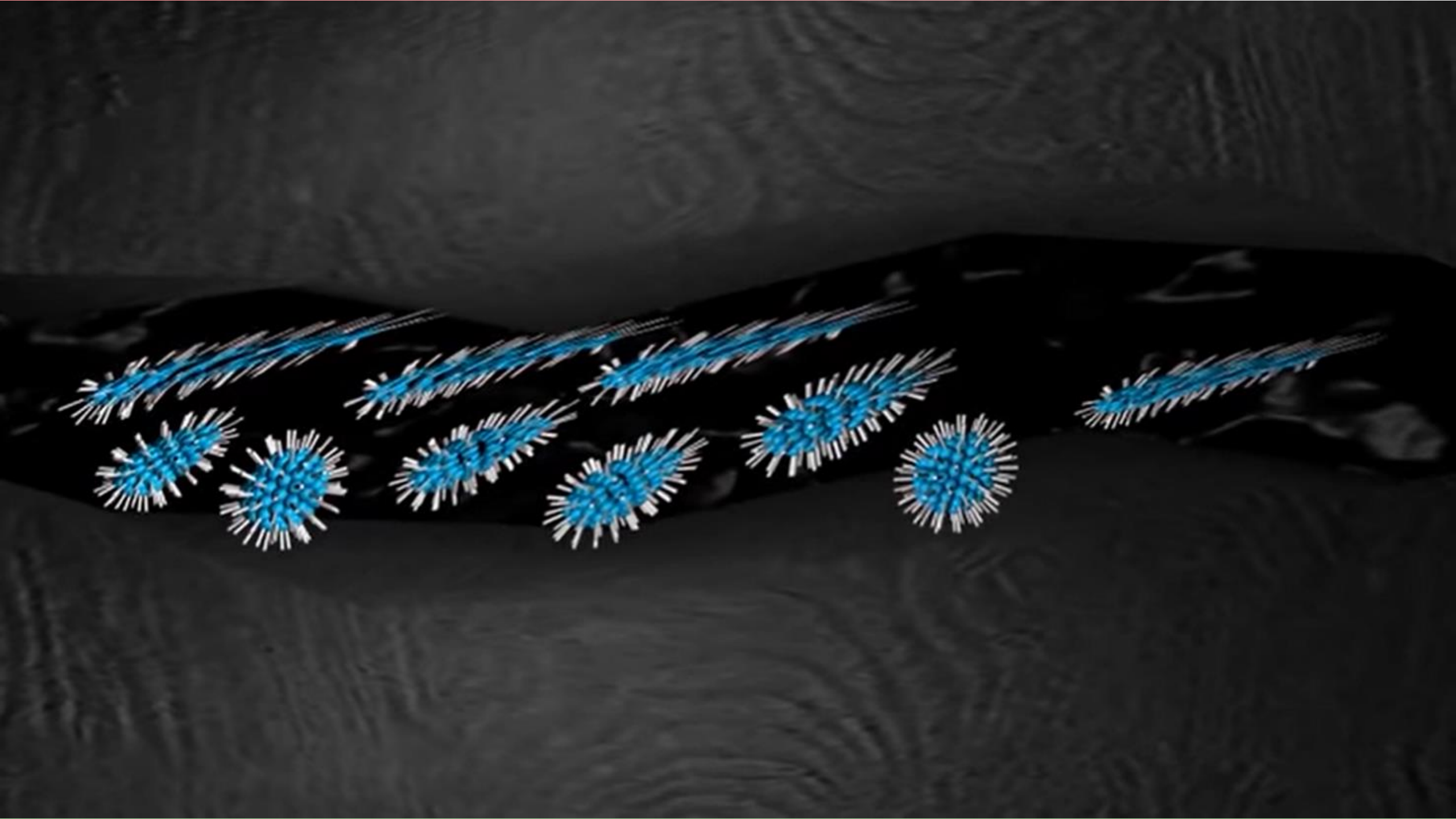


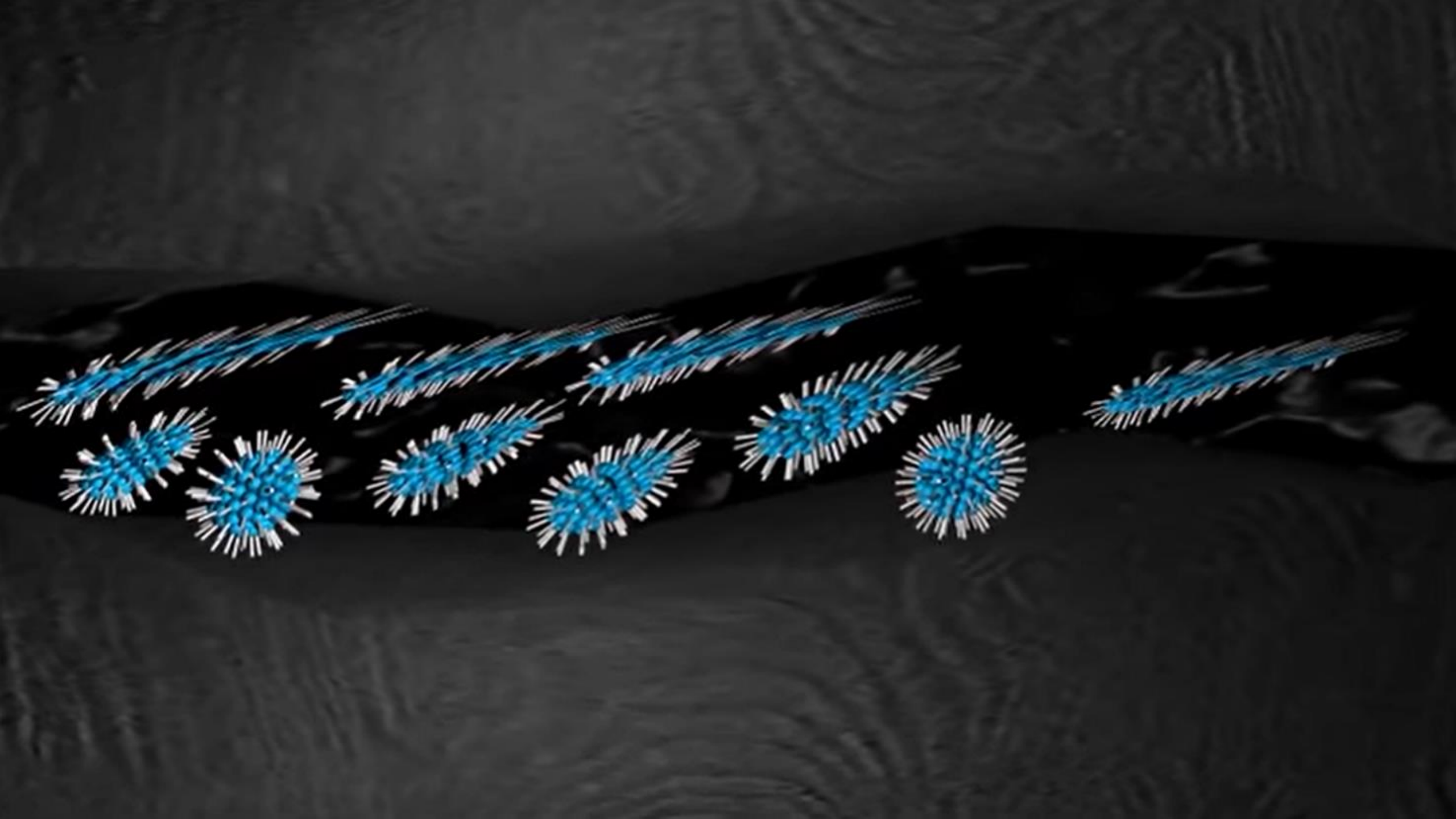


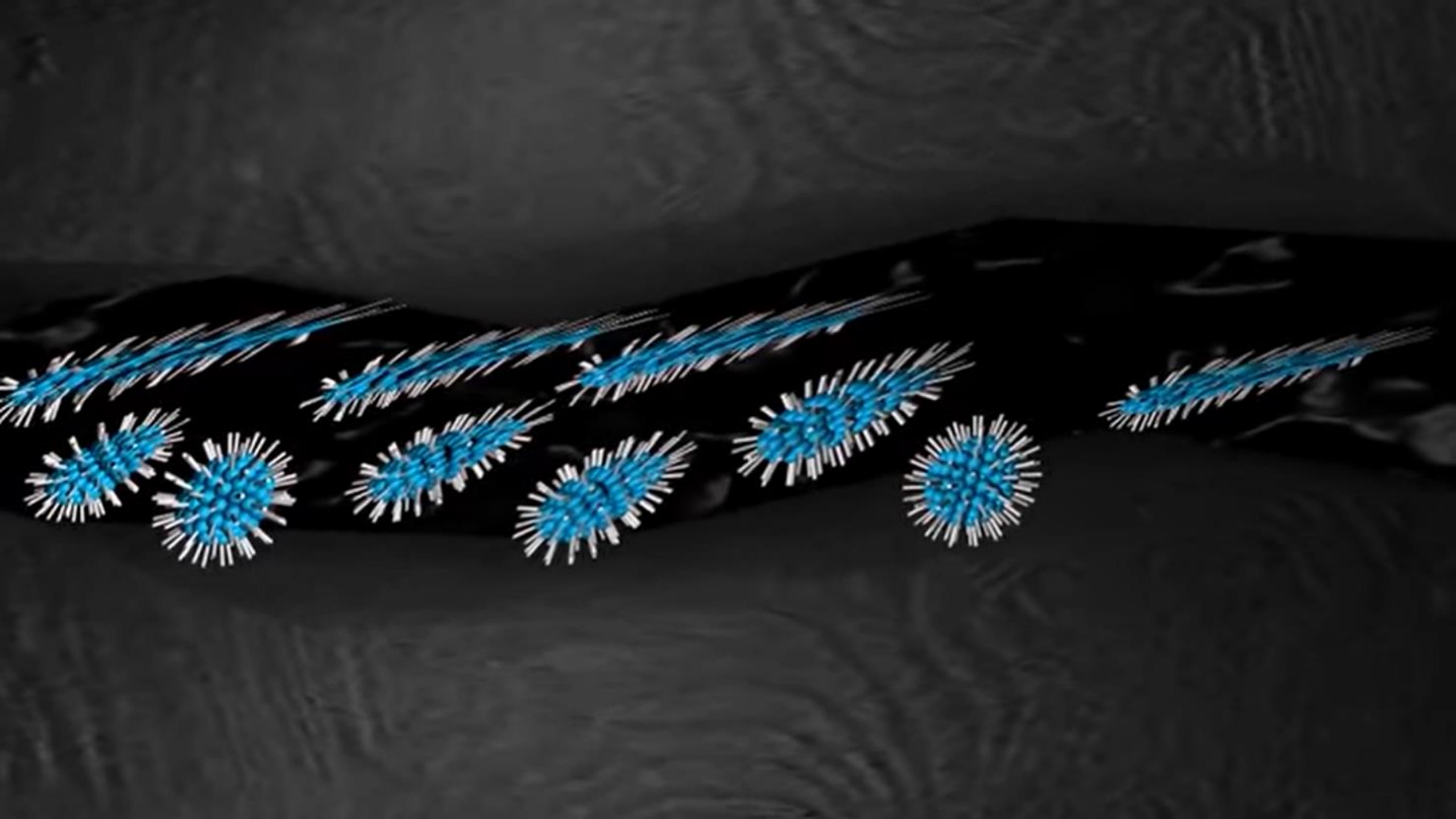


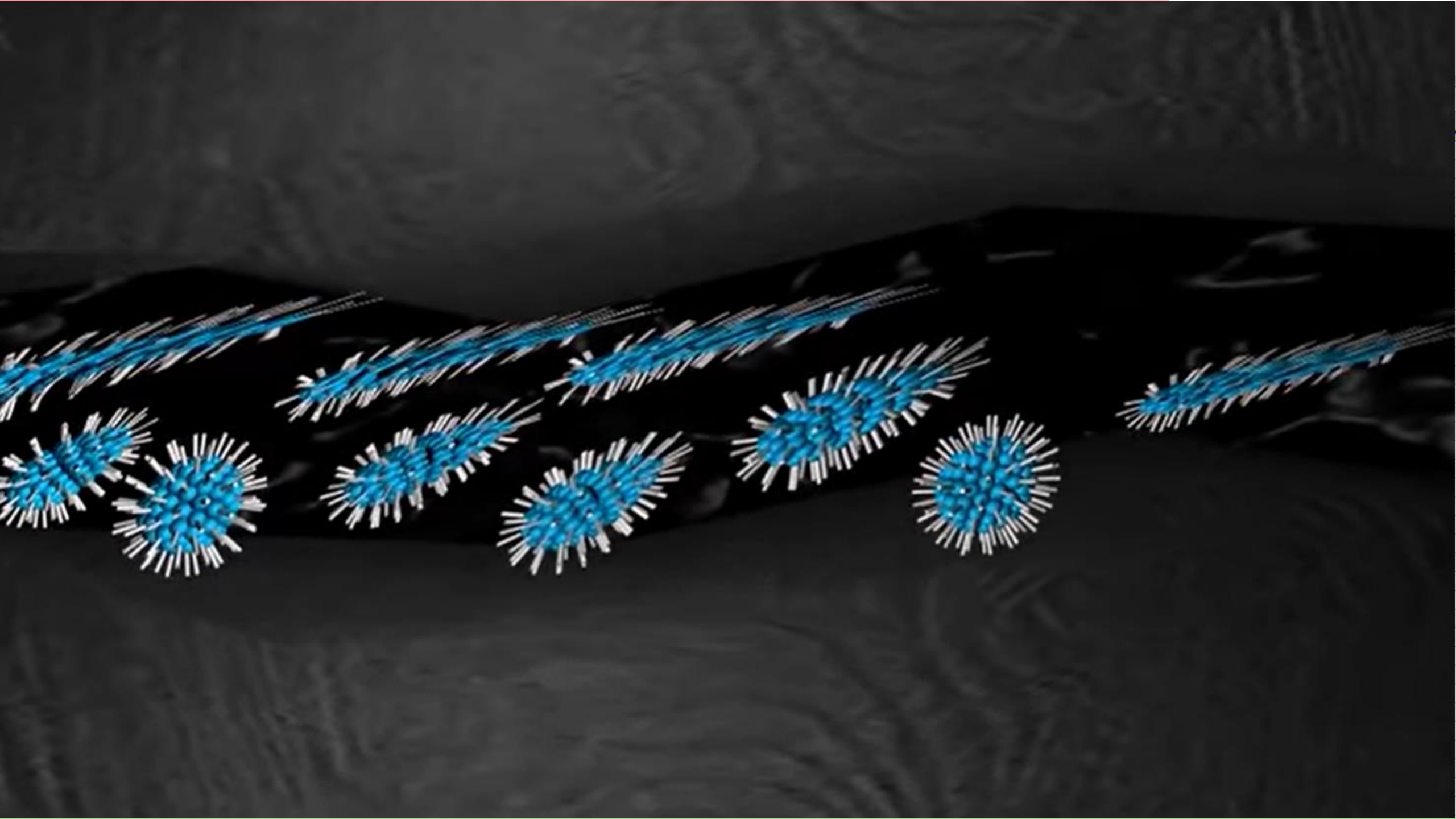


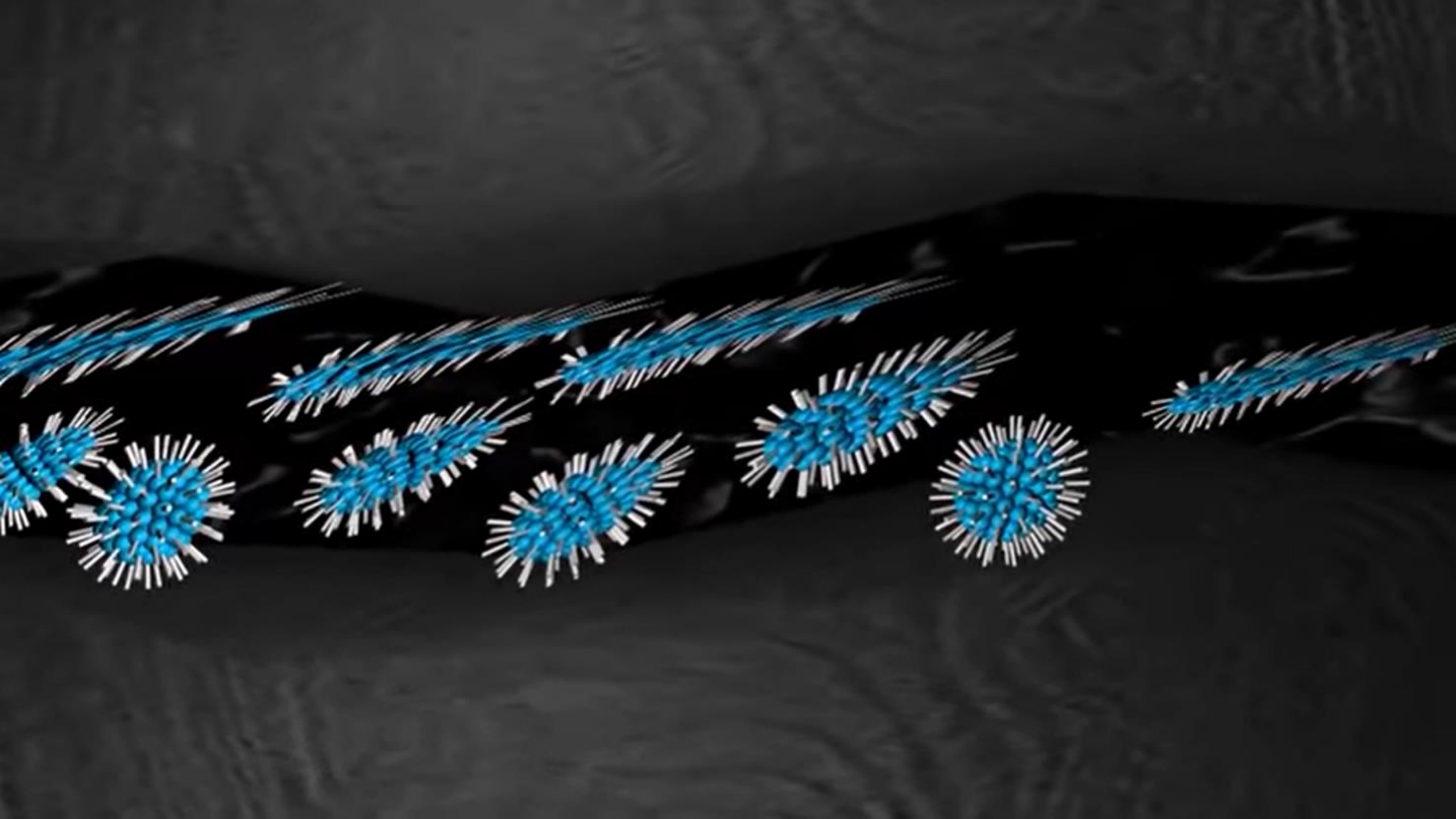


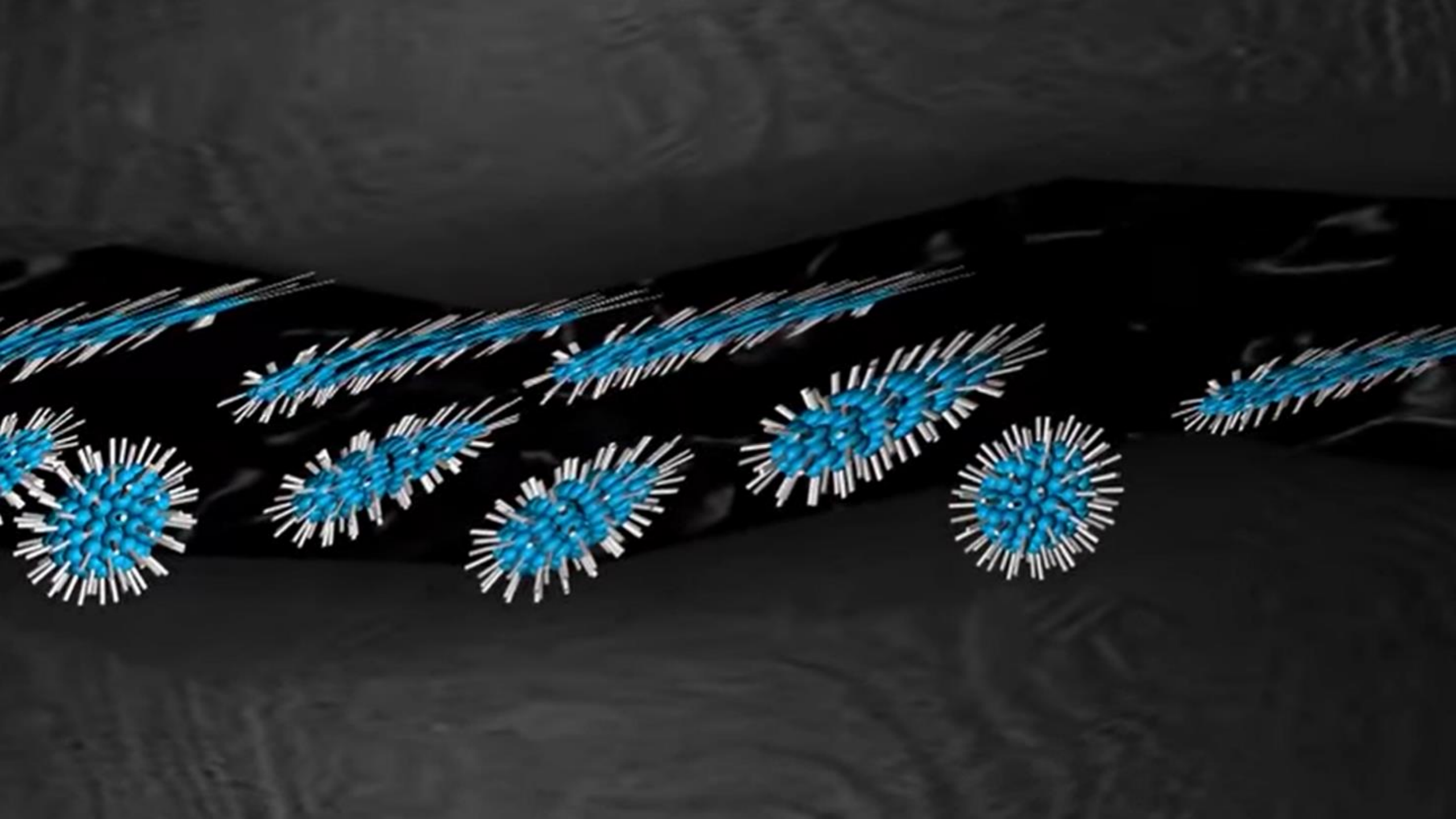


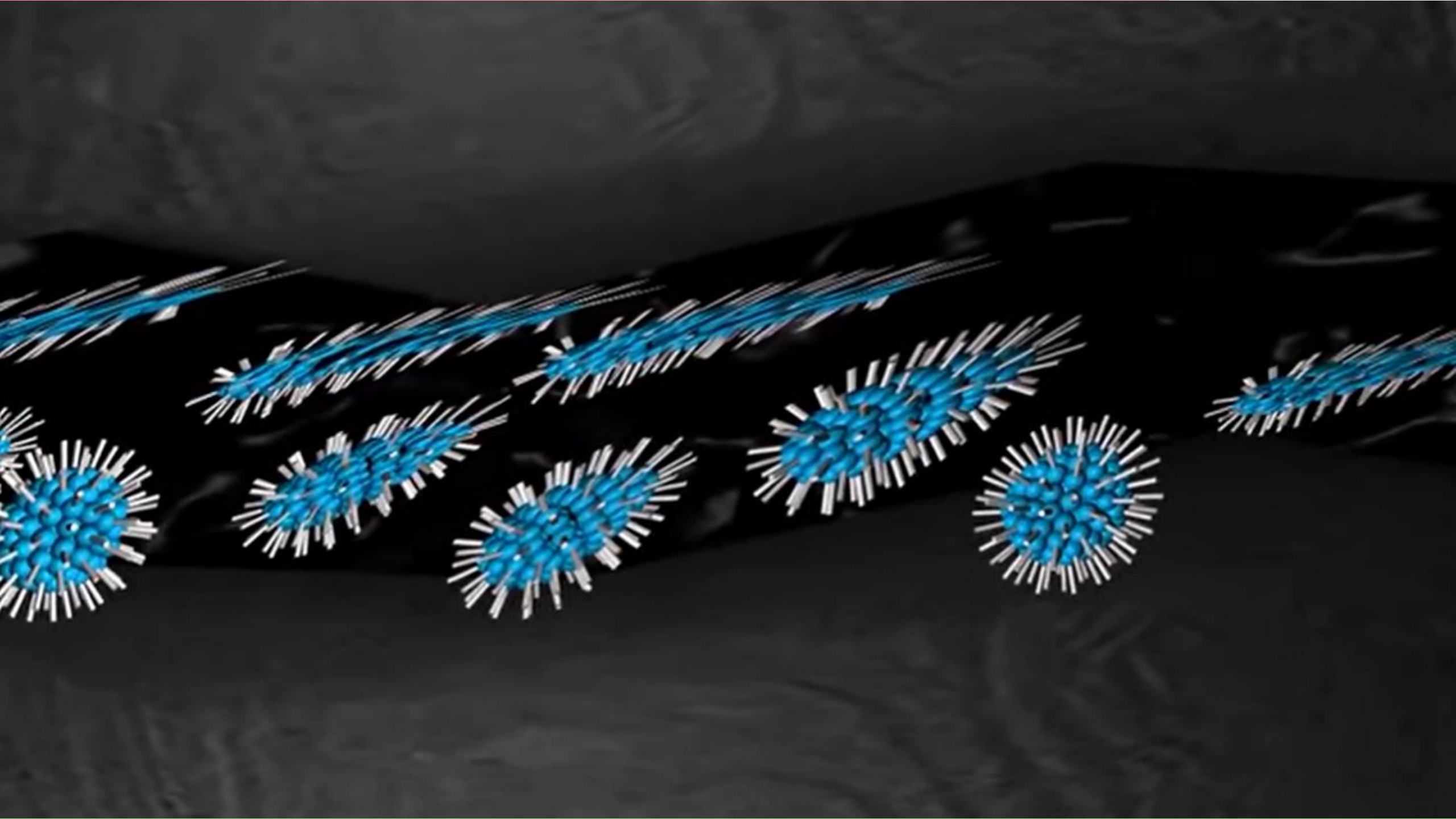


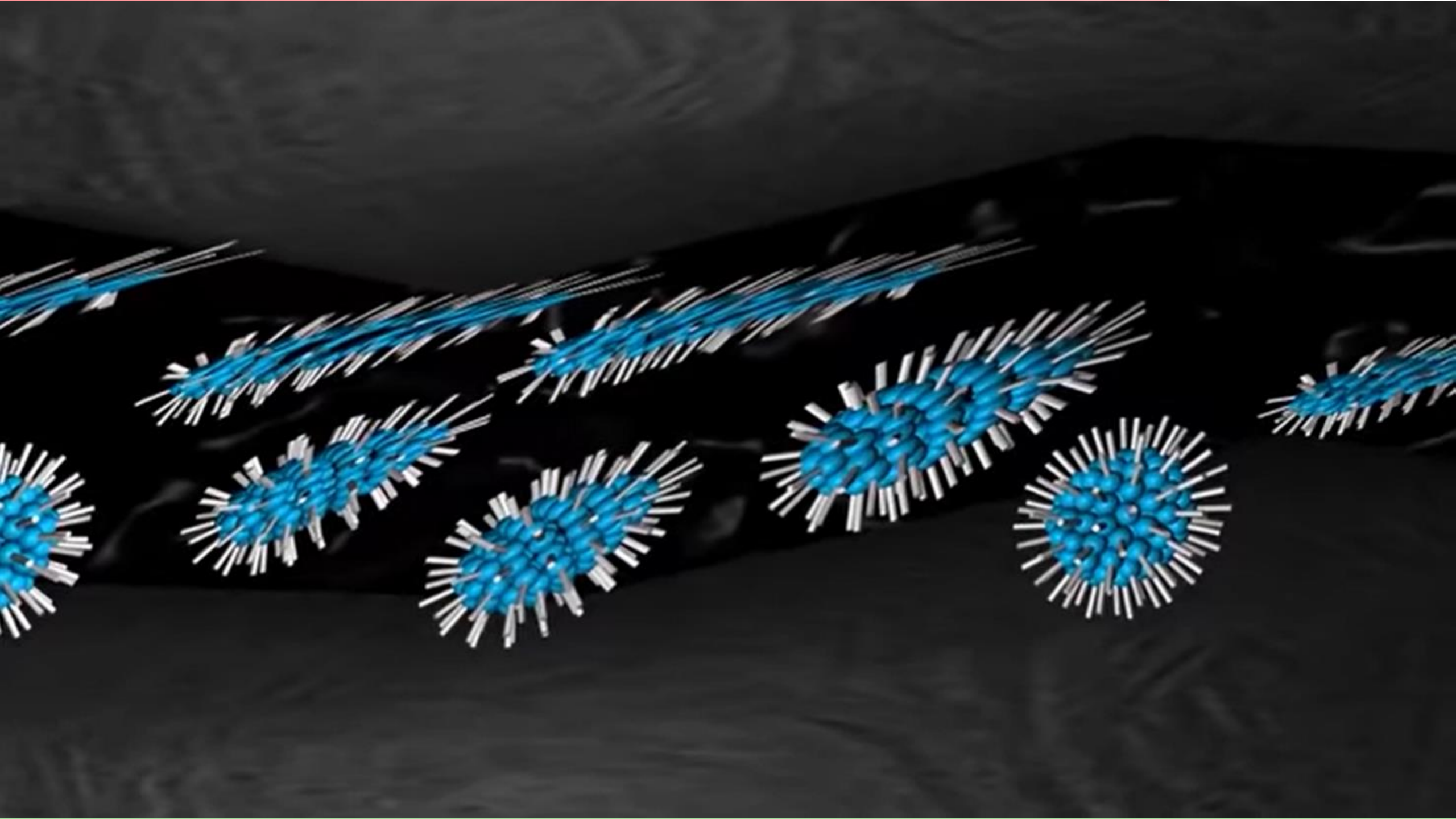


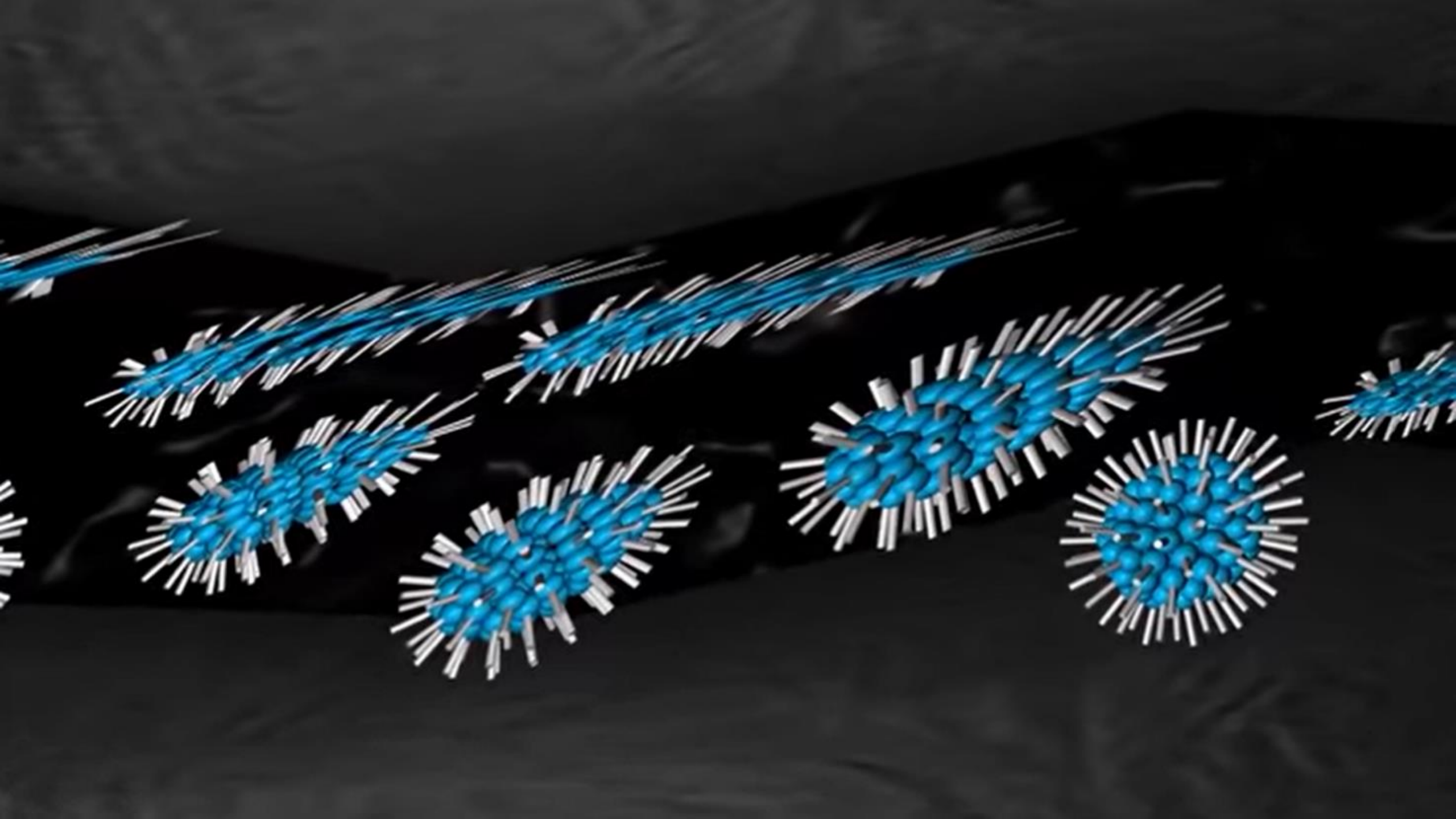


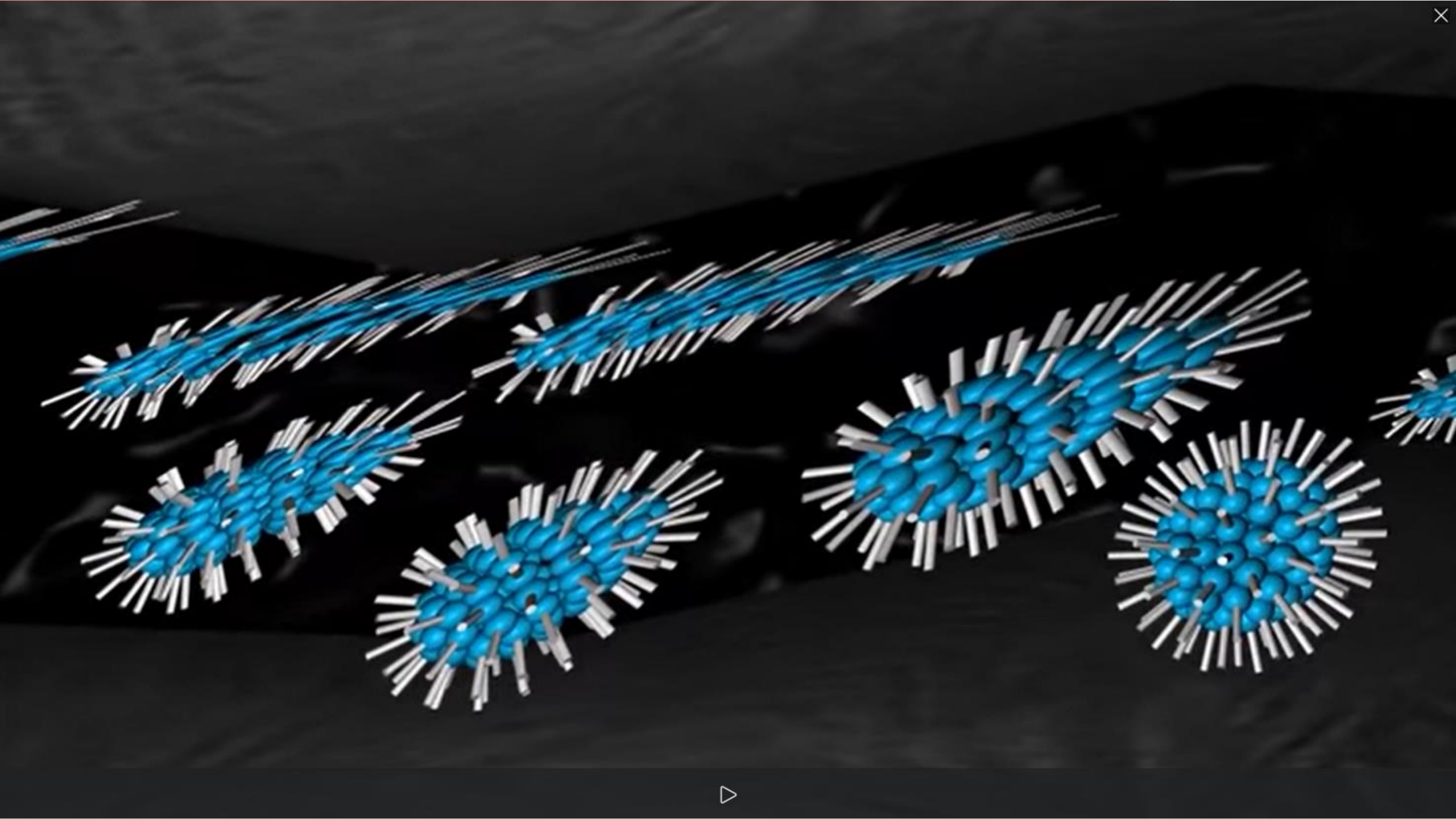




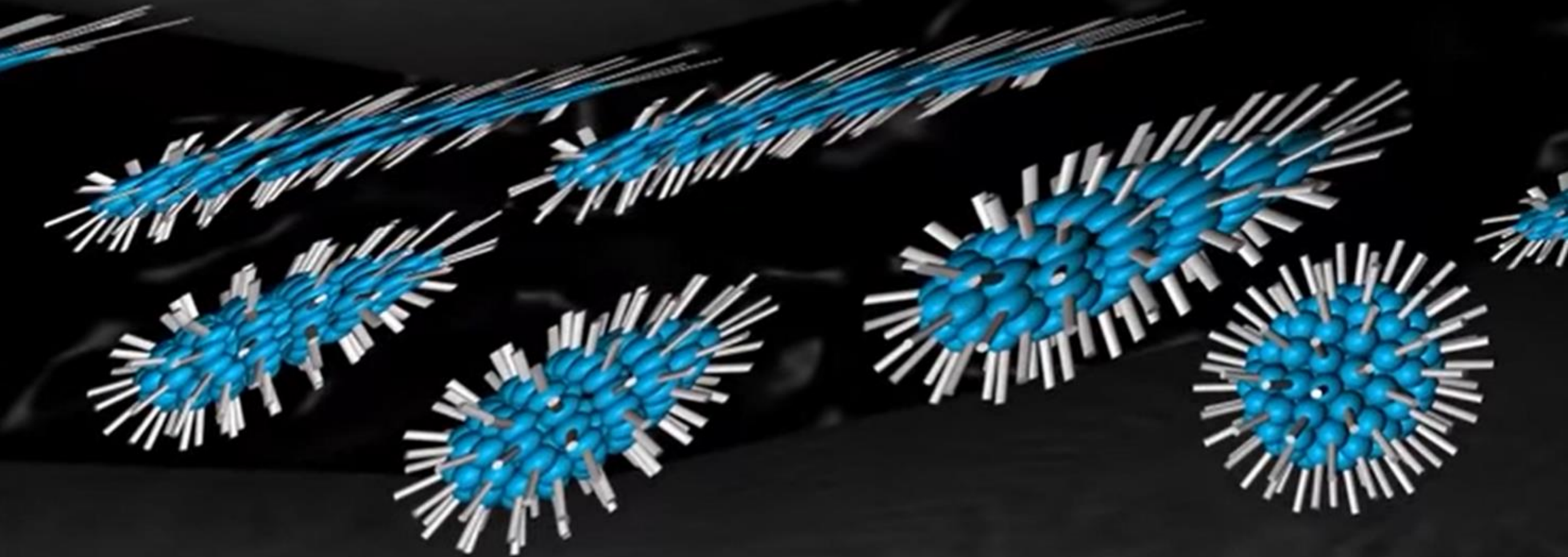




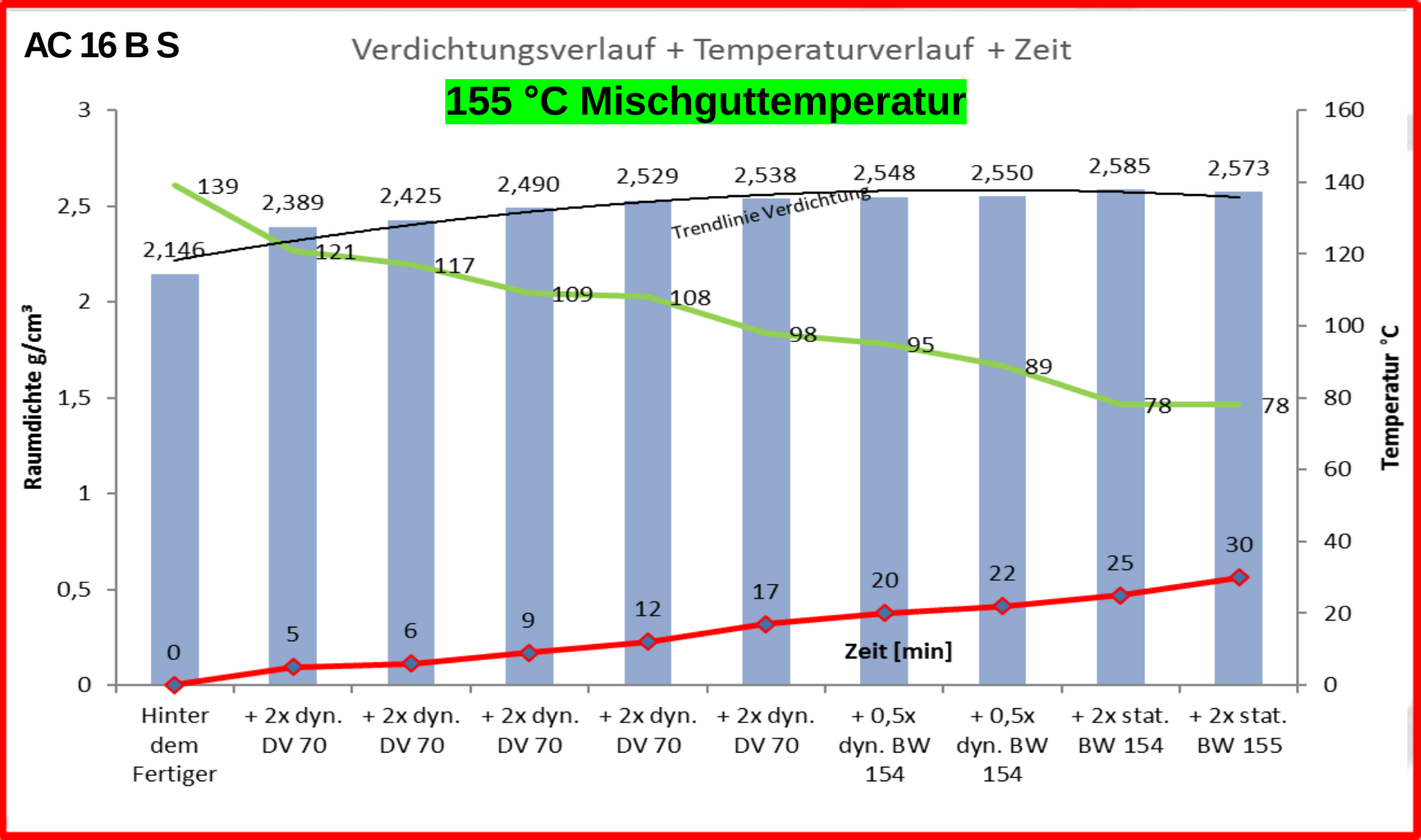




**Verdichtungseffekt
unter Scherkraft**

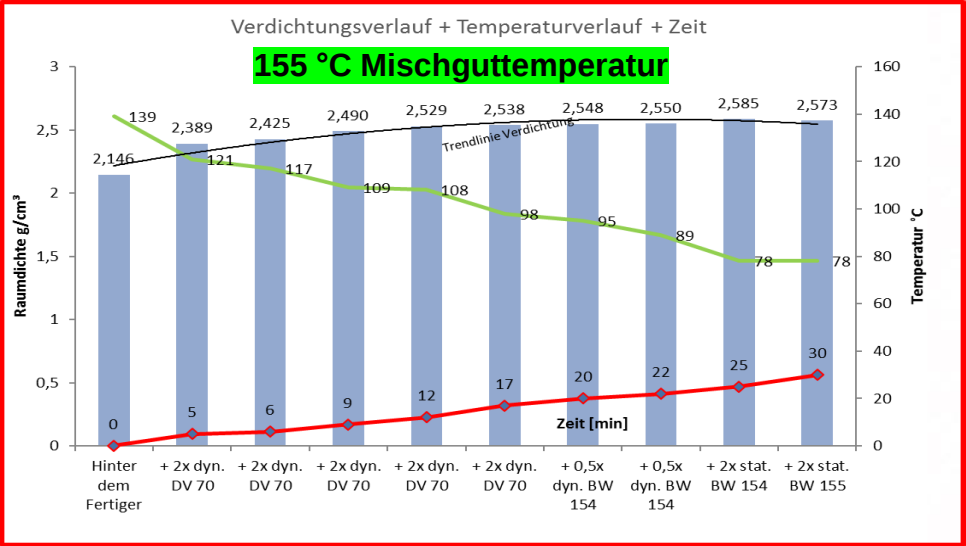


Fallbeispiel NTA mit oberflächenaktiven Additiven

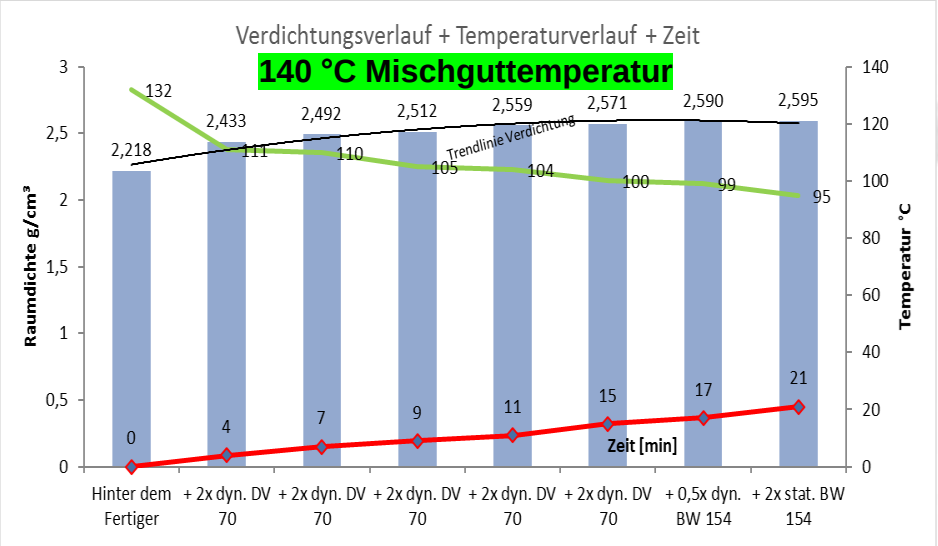


Fallbeispiel NTA mit oberflächenaktiven Additiven

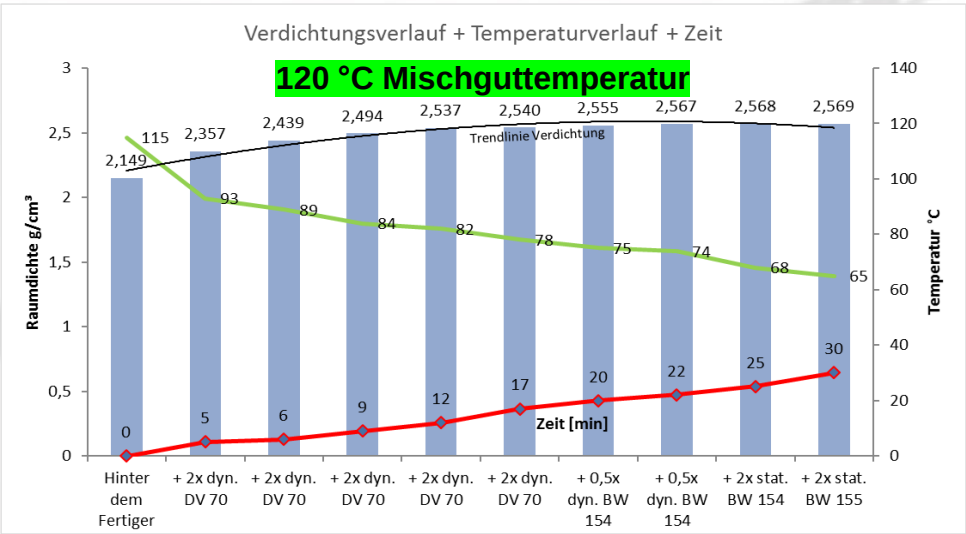
8 Walzbahnen



7 Walzbahnen

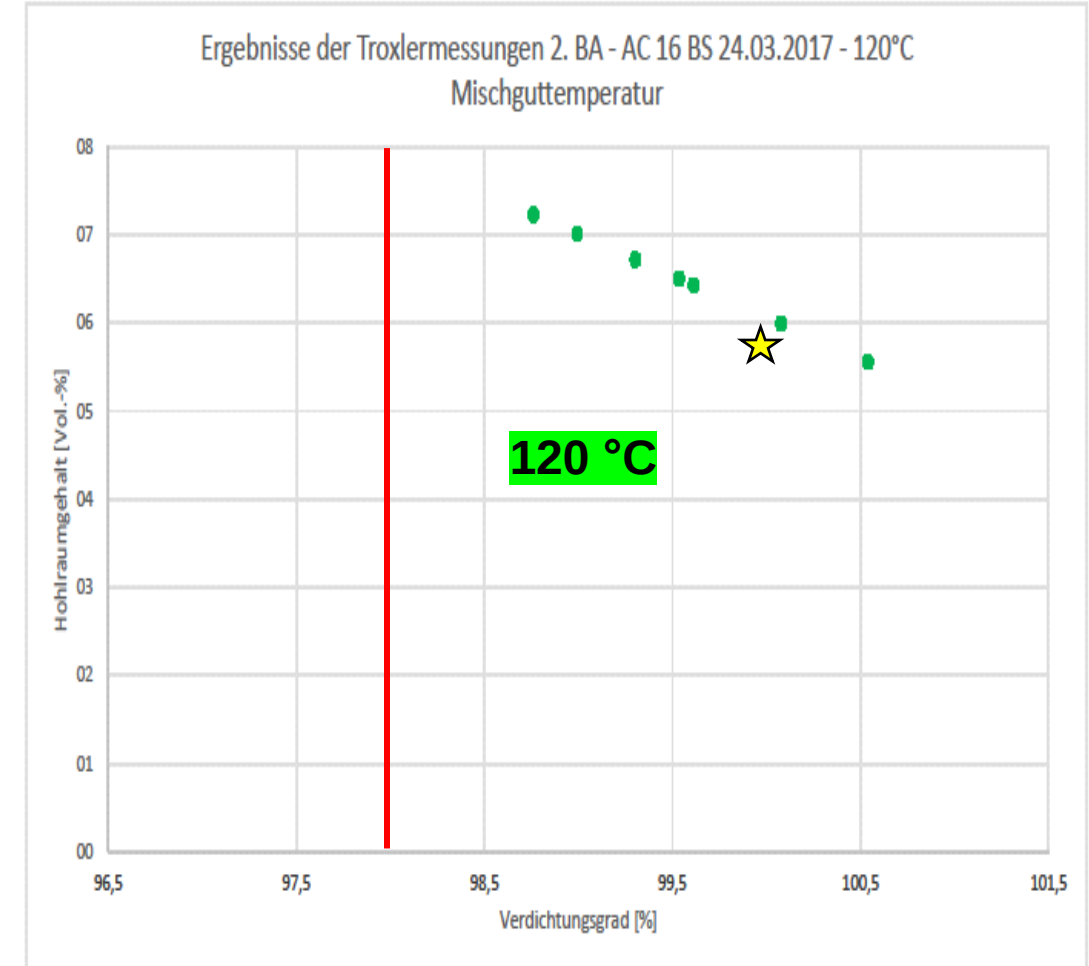
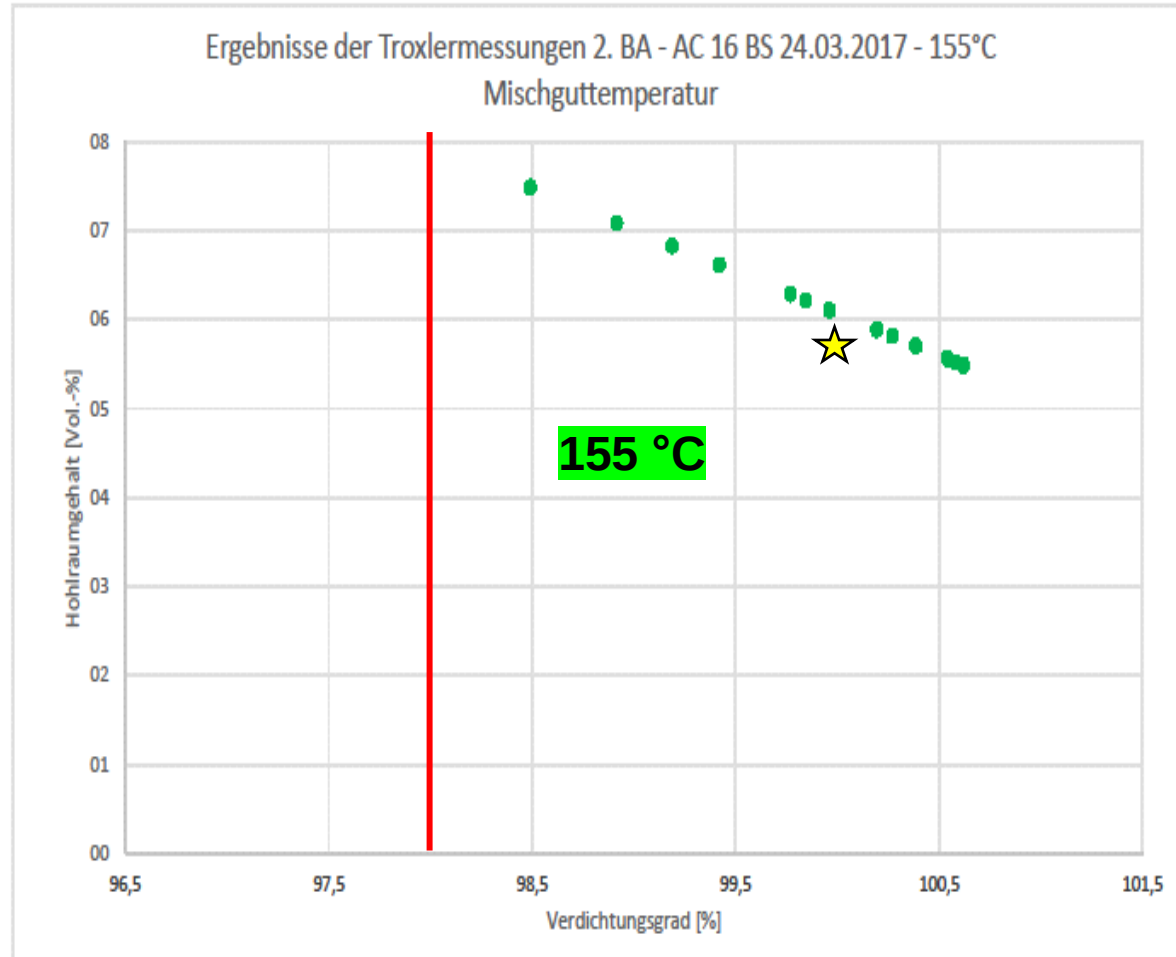


8 Walzbahnen



Quelle: SBT

Fallbeispiel NTA mit oberflächenaktiven Additiven



Zugabemengen zur Modifizierung mit oberflächenaktiven Additiven

ca. 95% + ca. 5% + ca. 0.02% = Leistungsstarke
Niedrigtemperaturasphaltstraße



Gesteine/ Füller



Bitumen/
Bindemittel



Oberflächenaktives
Additiv



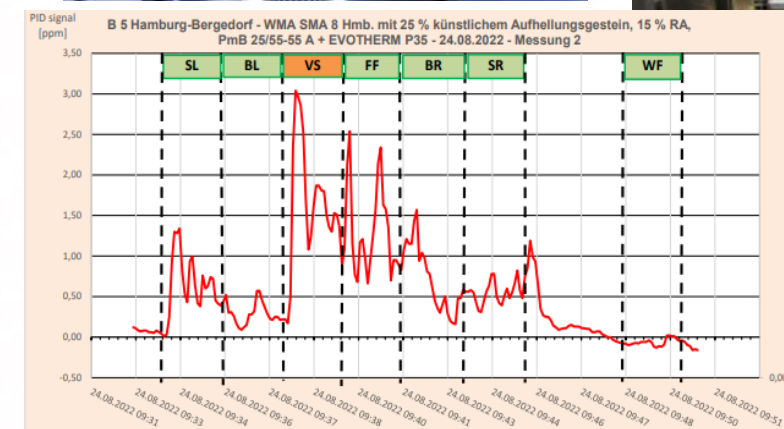
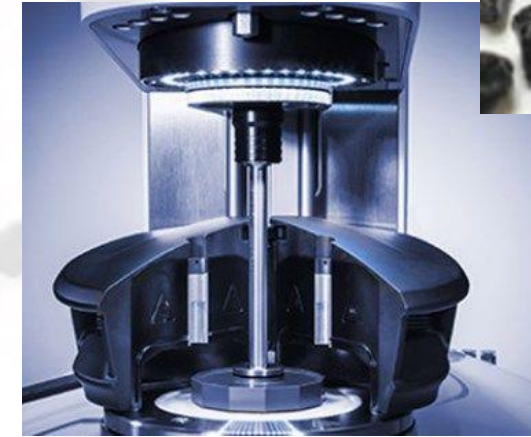
Modifizierungsarten von oberflächenaktiven Additiven

- Direktmodifizierung während des Mischprozesses über Flüssigdosierung
- Modifizierung des TKW vor Entladung in den Bitumentank
- Vorabmodifizierung – Beziehen eines Fertigbindemittels



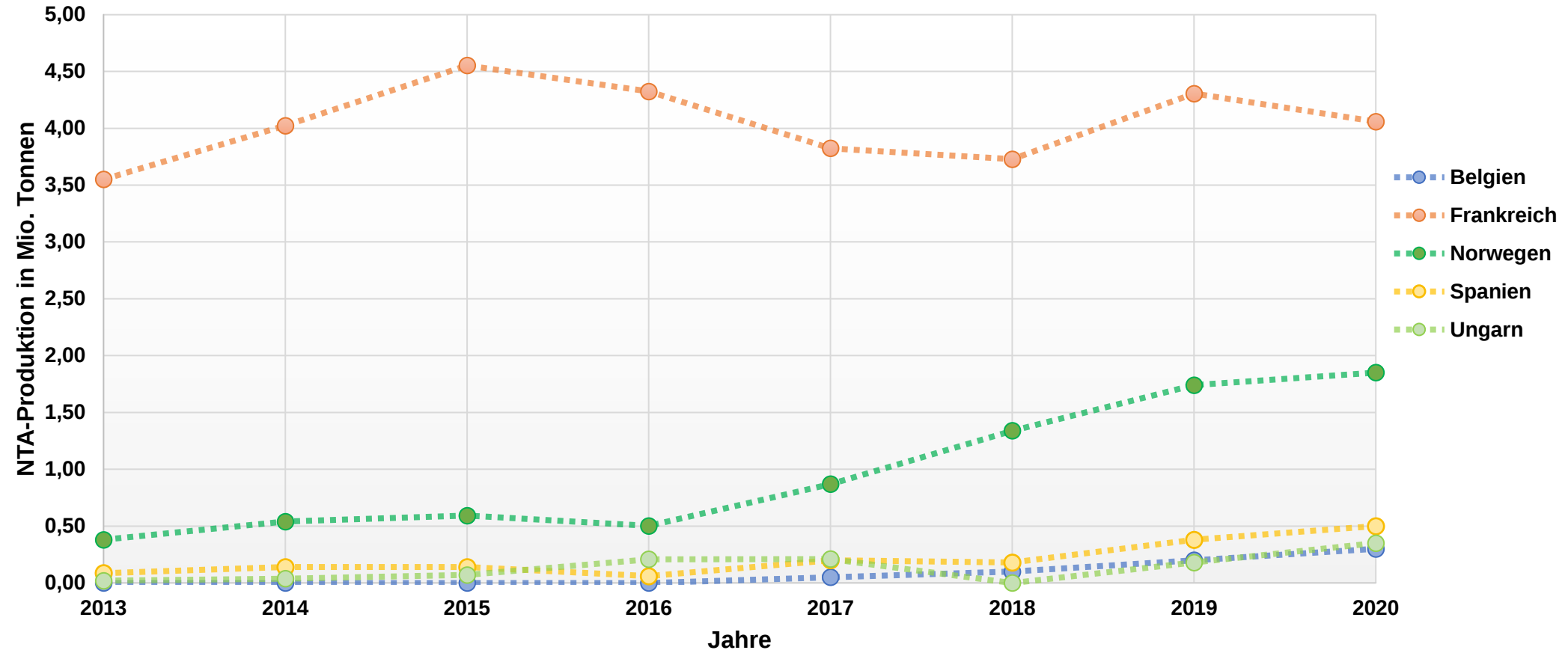
Zusammenfassung

- Oberflächenaktive Additive verringern die Oberflächenspannung zwischen Gestein und Bitumen und fördern somit die gleichmäßige Umhüllung während des Mischprozesses
- Oberflächenaktive Additive sind sehr gute Haftverbesserer
- Oberflächenaktive Additive dienen als Verdichtungshilfe (bis zu einer Asphaltkerntemperatur von ca. 70 °C)
- Oberflächenaktive Additive verändern NICHT die rheologischen Eigenschaften des verwendeten Bitumens
- NT-Asphalte erfahren eine geringere Bindemittelalterung
- Die Verwendung von oberflächenaktiven Additiven verbessern das Verhalten gegen Rissbildung im Tieftemperatur Bereich des Asphaltes
- die Emissionen bei Produktion (CO₂ und C-Gesamt) und Einbau (Dämpfe und Aerosole) können somit signifikant reduziert werden



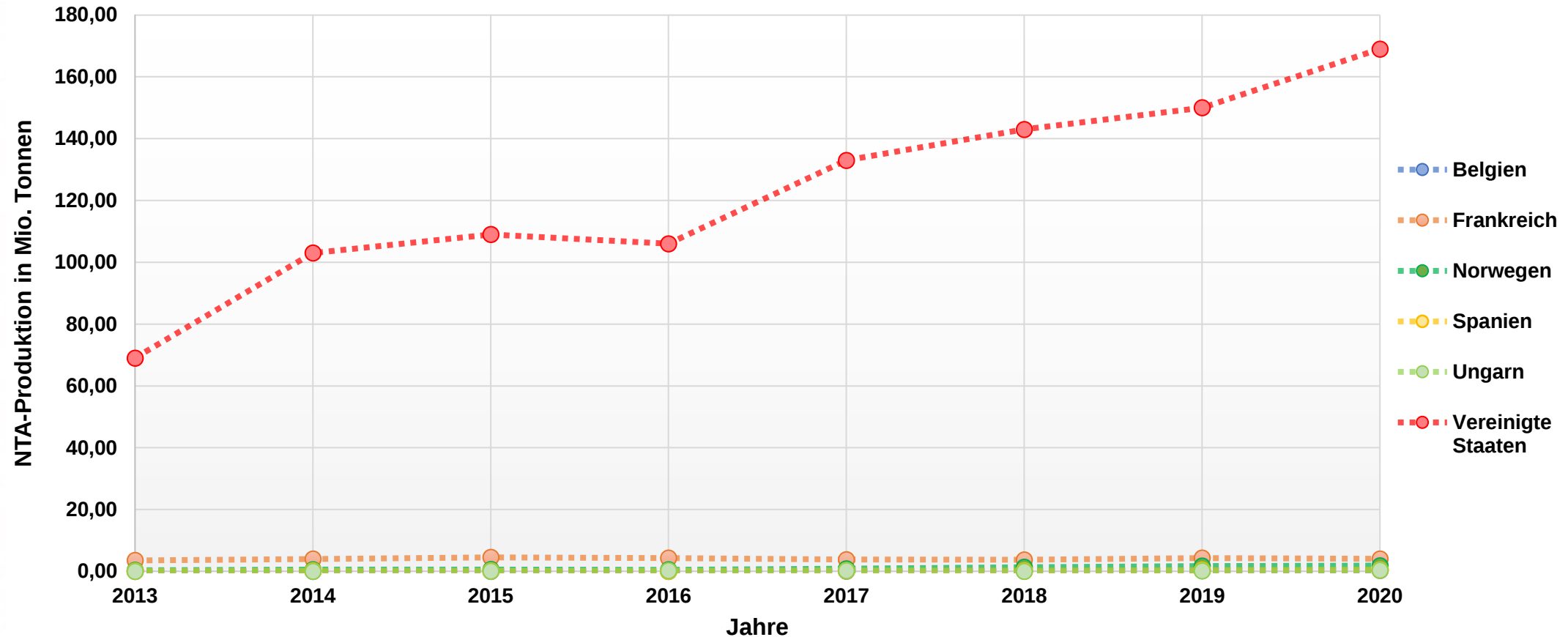
Was machen andere Länder?

NTA-Produktion in Mio Tonnen verschiedener Länder von 2013 bis 2020

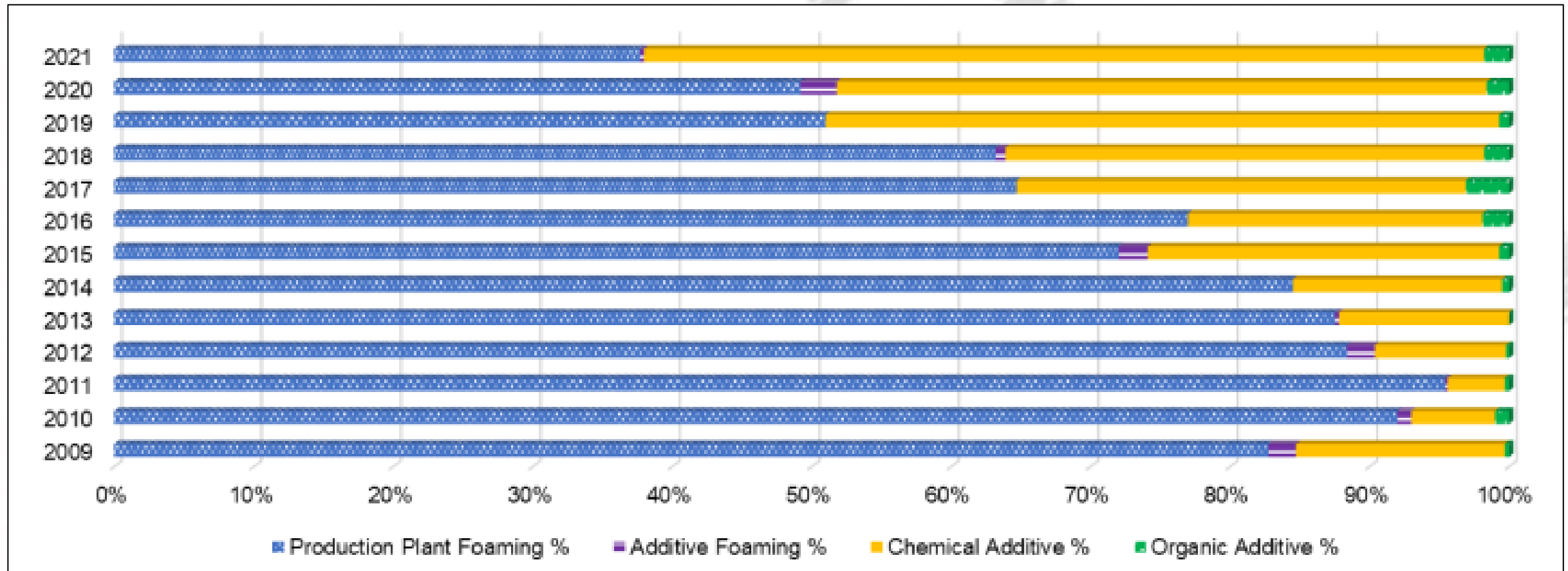


Was machen andere Länder?

NTA-Produktion in Mio Tonnen verschiedener Länder von 2013 bis 2020



Was machen andere Länder?



Quelle: NAPA

 **Produktion von Schaumbitumen**

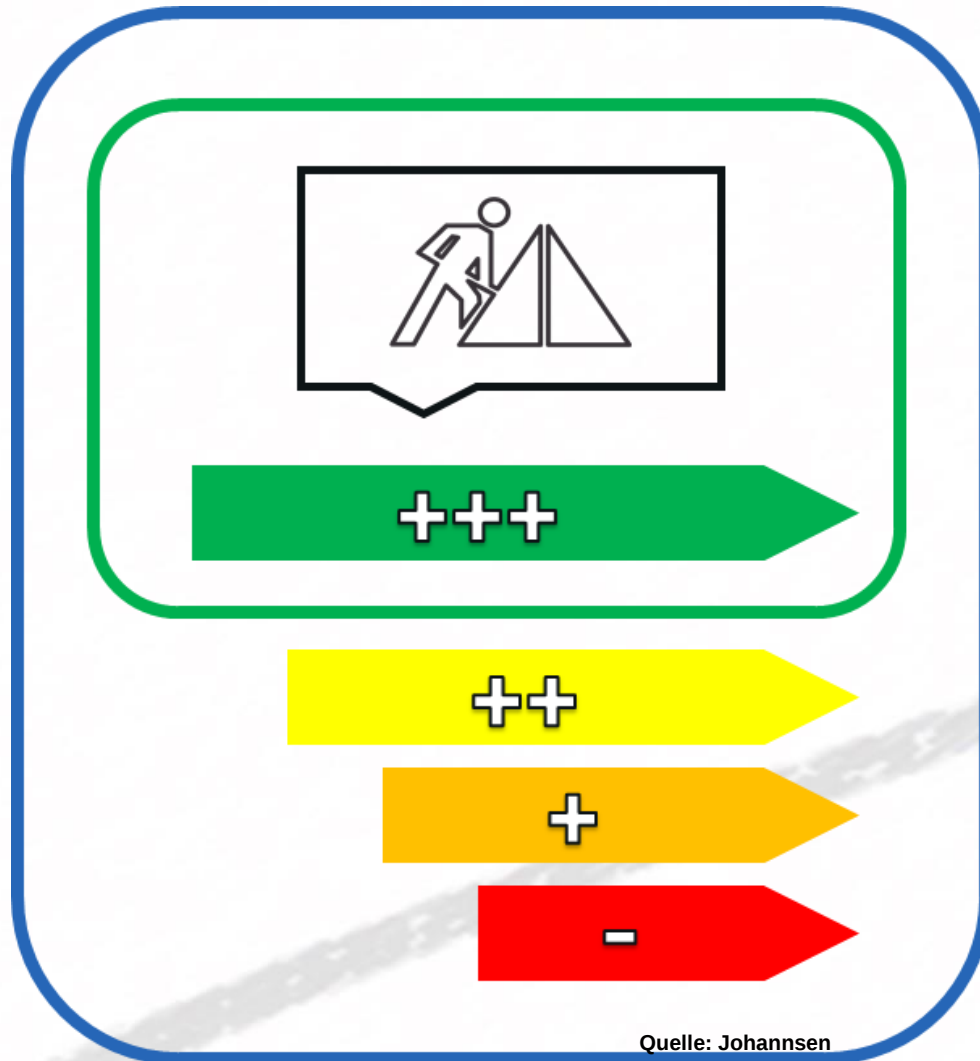
 **Oberflächenaktive Additive**

 **Mineralische VVZ**

 **Organische VVZ**

DER BESSERE ASPHALT

(...durch WMA)



Quelle: Johannsen