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Long-term low shear of a waxy potato starch paste produces a highly viscous gel by formation of intermolecular double-helices. FANG FANG, Whistler Center for Carbohydrate Research and Department of Food Science, Purdue University, XIAO ZHU, Information Technology at Purdue (ITaP), Purdue University, MARIO MARTINEZ, Whistler Center for Carbohydrate Research and Department of Food Science, Purdue University, OSVALDO CAMPANELLA, Whister Center for Carbohydrate Research, Purdue University, Department of Food Science and Technology, The Ohio State Unviersity, BRUCE HAMAKER, Whistler Center for Carbohydrate Research and Department of Food Science, Purdue University — Our group recently reported that waxy potato and corn pure starch amylopectin pastes undergo a shear-thickening behavior at a low shear rate range of 5 to 25 s^{-1}, and that the effect did not occur in waxy rice starch. Here, we show that gelatinized potato amylopectin subjected to prolonged shear at 20 s^{-1} for 24 h at 5°C produced a highly viscous gel with 5x more double-helices than without shear. Shear-induced aggregates formed within 20 min. Double-helices melted between 40 to 75°C leading to a total loss of gel elasticity and a steep decrease in G', indicating that the retrogradation process occurred in part among amylopectin molecules (i.e. intermolecularly). Thus, a new phenomenon is reported whereby waxy potato amylopectin with long linear chains forms double-helical aggregated structures in the presence of long-term low shear that dramatically affects material properties.

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