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(71) Applicant: PPG INDUSTRIES OHIO, INC. [US/US];
3800 West 143rd Street, Cleveland, OH 44111 (US).

(72) Inventors: SUDOUR, Michel; 34, Route Departementale
50, 59990 Sebourg (FR). WOZNIAK, Aline; Residence
Tamaris, 113, Avenue Henri Barbusse, 59770 Marly (FR).
MAINTIER, Philippe; 3 Place Publique, 59144 Jenlain
(FR).

(74) Agents: MEYERS, Diane, R. et al.; PPG Industries, Inc.,
One PPG Place, 39th Floor, Pittsburgh, PA 15272 (US).

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(54) Title: ZIRCONIUM PRETREATMENT COMPOSITIONS CONTAINING LITHIUM, ASSOCIATED METHODS FOR
TREATING METAL SUBSTRATES, AND RELATED COATED METAL SUBSTRATES

(57) Abstract: Disclosed are pretreatment compositions and associated methods for treating metal substrates with pretreatment com-
positions, including ferrous substrates, such as cold rolled steel and electrogalvanized steel. The pretreatment composition includes:
a Group IIIB and/or IVB metal; free fluoride; and lithium. The methods include contacting the metal substrates with the pretreatment
composition.



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