

# Elektrochemiese en adsorpsiestudies van die metaalorganiese netwerk, NH<sub>2</sub>-MIL-53(Al)

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satnt.v35i1.1422](http://dx.doi.org/10.4102/satnt.v35i1.1422)**Copyright:**© 2016. The Authors.  
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Attribution License.**Electrochemical and Adsorption Studies of the Metal Organic Framework, NH<sub>2</sub>-MIL-53(Al).**

NH<sub>2</sub>-MIL-53(Al) is an amino-functionalised derivative of the metal organic framework MIL-53(Al). When successfully synthesised, it has the ability to be functionalised with metal complexes. A new solvo-intrusion method was used to study the amidation with butyric acid and ferrocenecarboxylic acid.

NH<sub>2</sub>-MIL-53(Al) is 'n amengefunksionaliseerde derivaat van die mikroporeuse metaalorganiese netwerk, MIL-53(Al) (Ahnfeldt *et al.* 2009). 'n Netwerk van 1-dimensionele diamantvormige kanale (~10 Å in deursnee) word gevorm deur aluminium- (III) oktahedrale hoekstene deur middel van 2-aminotereftaalsuurlikande onderling te verbind. Aluminium (III), afwisselend gekoördineer met suurstof, vorm liniêre kettings op die hoeke van die diamantvormige kanale. Die 2-aminotereftaalsuurlikande vorm dus die vier sye van die kanale. Vanweë sy organiese verbindingsligande is hierdie netwerkstruktuur besonder buigsaam afhangend van die temperatuur en die aard van die geadsorbeerde molekules. Ná 'n solvotermiese hoëdruk-skoonmaakproses is die gevormde NH<sub>2</sub>-MIL-53(Al) termies hoogs stabiel (-400 °C) en ook omkeerbaar higroskopies.

NH<sub>2</sub>-MIL-53(Al) is sonder enige geadsorbeerde spesies 'n goeie heterogene katalis vir die Knoevenagel-kondensasie-reaksie (Gascon *et al.* 2009). Palladiumnanodeeltjies in NH<sub>2</sub>-MIL-53(Al) het tydens die Suzuki-Miyaura-kruiskoppelingreaksie goeie katalitiese aktiwiteit getoon (Huang *et al.* 2011). Ongefunksionaliseerde MIL-53(Al) kan gesublimeerde ferroseen adsorbeer (Meilikhov, Yussenko & Fischer 2009a) en is ook al gefunksionaliseer met 1-1'-ferroseendiildimetielsilaan om as redokskatalis vir benseenoksidase op te tree (Meilikhov, Yussenko & Fischer 2009b). Ons studie is egter daarop gemik om die chemiese adsorpsie van karboksiesure en die proses daarvan in NH<sub>2</sub>-MIL-53(Al) te verbeter.

In hierdie studie is 'n nuwe solvo-intrusiemetode ontwerp om die adsorpsie van bottersuur en ferroseenkarboksiesuur in NH<sub>2</sub>-MIL-53(Al) te bestudeer. Dit is 'n baie belangrike konsep omdat die netwerkkanale slegs molekule kleiner as 13.04 Å kan deurlaat (Horcajada *et al.* 2008). 'n Vergelykende tydstudie is gedoen om die minimum tyd te bepaal wat die hoogste lading van beide die bogenoemde molekules gee. Die hoeveelheid lading is bepaal deur 'n termogravimetriele analise (TGA) en kernmagnetiese resonansspektroskopie (KMR). Postsintetiese, direkte amidasie van NH<sub>2</sub>-MIL-53(Al) is met bottersuur en ferroseenkarboksiesuur bereik. Hierna is die elektriese geleidingseienskappe van ferroseenkarboksiesuur in NH<sub>2</sub>-MIL-53(Al) bepaal deur 'n nuut ontwerpte vastetoestand- sikliese voltametriemethode.

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